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Containing an Epitome of the ART of LAND-SURVEYING,
drawn up, for the Uſe of his own PUPILS,

By J. VAUGHAN,

TEACHER OF THE ENGLISH AND LATIN TONGUES, WRITING, ARITHMETIC,
THE MATHEMATICS, &C. AT MALPAS, IN CHESHIRE.

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In every Work regard the Writer's *End*,
Since none can compaſs *more* than they *intend*;
And if the Means be juſt, the Conduct true,
Applauſe, in ſpite of trivial Faults, *is due*.—POPE.

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TO THE REVEREND

SIR THOMAS EDWARDES, BART.

FRODESLEY, SHROPSHIRE.

REV. SIR,

AS a dubious Artiſt, after having conſtructed ſome new Invention, deſirous of rendering it as perfect as poſſible, applies to the *original Deſigner*; whoſe ſuperior Penetration may either point out farther Improvements, or diſcover Defects unknown to the Author of them; ſo I, (preſuming upon that Generoſity which has hitherto deigned to countenance this

Attempt) ſolicit your Acceptance of that which your Kindneſs enables me to offer. And this I am directed to do by *Gratitude* and Reaſon: Gratitude, as it affords me an Opportunity of acknowledging how much I am indebted in *this*, as well as in other reſpects; and Reaſon, which points out the Neceſſity of a Reviſion, and *emboldens* me, if the Leiſure of an Hour occurs, to requeſt that from you, in addition to the Favours already conferred upon,

Reverend Sir,

Your moſt obedient, much obliged,

And very humble Servant,

Malpas Grammar School,
27th December, 1794.

J. VAUGHAN.

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THE

PREFACE.

SO many Books having been already publiſhed on every uſeful Subject, and among thoſe books, many, whoſe excellence fruſtrates the efforts of rivalſhip, and *entitles* them to the publick patronage; it ſeems incumbent on every modern author, (eſpecially one who is conſcious of poſſeſſing no talents ſuperior to thoſe which others poſſeſs who have written upon the ſame ſubject) to give an account of the *true* reaſons which induce him to publiſh.

In juſtice to all authors of books on Land-Surveying, I muſt here beg leave to premiſe, that it is not becauſe *their* books do not anſwer the purpoſe they are deſigned for, that *this* Pocket Aſſiſtant makes its appearance: for, except in the APPENDIX, *their* Plans and Deſigns are quite different to *mine*; their's being to convey a complete knowledge of Land-Surveying and all its branches, to one who muſt previouſly be inſtructed in Arithmetic, Geometry, &c. whereas the deſign of the POCKET ASSISTANT is, to enable a perſon, though he has *no* learning higher than the reading and underſtanding of Words and Figures, to find the Contents of his Field; and this, by a method *uncommonly expeditious*; for, no ſooner have you taken the dimenſions, than the Tables tell you the Contents, without either pen, or arithmetical calculation.

Hence, I preſume, theſe Tables will be found uſeful to men of every degree. To the *learned Surveyor* they will ſave both trouble and time: to the *unlearned*, they will convey that knowledge, which, for want of a due degree of learning, he cannot acquire from *other* authors.

To the *Gentleman*, this method may afford a new and healthful amuſement; as it may be an inducement to him to walk more into his fields, when he conſiders that meaſuring by the ſtep may render a chain uſeleſs, except in caſes where critical exactneſs is required; and by a very little practice he will be capable of adjuſting his ſtep to a yard; while the uſe of theſe Tables, taking away the *neceſſity* of calculation, will diſpel that tedioufneſs, which hitherto deterred him from *curſory* Surveys. But above all, to the *Farmer*, its uſe will be greateſt. In the cultivation of his land, every *judicious* Farmer has an eye upon the quantity, by knowing of which he is enabled to prepare his ſeed, and to eſtimate the value of that which his labourers are about to undertake; ſoon finding, that an ignorance of the quantity of land which he cultivates, is quite incompatible with that regular management and œconomy, likely to inſure *Succeſs* in Agriculture.

In ſhort, the great utility of Land-Meaſuring to Farmers is ſo *evident* and *well known*, that to go about to *prove* it, would be like ranſacking the intricacies of logic to prove the whiteneſs of *ſnow*. I ſhall therefore turn from *that* buſineſs, to obſerve, that as the occaſions and inclinations of many Farmers to know the Contents of Fields, happen much more frequently, than they judge it *convenient* to employ Surveyors, I thought it would not be in my power to render them a more eſſential ſervice, than by publiſhing theſe Tables, by the help of which every Farmer may become *his own Land-Meaſurer*.

The SECOND TABLE is upon a larger plan, deſigned to aſſiſt Gentlemen and Farmers in *computing* the quantity of whole Eſtates, or large parcels of Land, by a *mean length* and breadth; and will, I think, be found very ſerviceable to each of them, as it may ſave them ſcores of pounds if *ſeaſonably* conſulted. This Table contains the length and breadth of quantities of Land, from 10 acres to 150 acres, which may be increaſed to what quantities you pleaſe by doubling, trebling, &c. any quantity and its correſponding length or breadth; or by doubling, trebling, &c. any length or breadth and its correſponding quantity.

Table the THIRD is drawn up *at the requeſt of ſeveral Gentlemen and Farmers* in CHESHIRE and SHROPSHIRE, to aſſiſt them in finding the contents of a piece of Land in roods of 64 yards each, that being the meaſure by which labourers uſually undertake various kinds of work, particularly gardening, &c. Now, as the conſtruction of this Table is nearly ſimilar to that of the others, a Deſcription or Explanation is certainly unneceſſary: as to its accuracy, I muſt requeſt the Reader to conſider, that, as in the other Tables, ſo here, I could have expreſſed each breadth with the greateſt exactneſs by decimals; but as decimals would not be underſtood by many for whoſe uſe theſe Tables are deſigned, I adopted a plan leſs exact, but more univerſally underſtood.

☞ After what has been ſaid, it will be ſuperfluous to ſhew the uſe of the Tables in the *Valuation of Tythes and ſpecific Crops of Grain, &c.* as it is neceſſary to obtain a *ſpeedy* knowledge of the quantity, previous to the valuation of it: therefore, as theſe Tables facilitate the former, I hope they will be found particularly uſeful in the latter.

The APPENDIX is added, as expreſſed in the Title-Page, for the uſe of my own Pupils; particularly of ſuch, as having more learning to *acquire* than time to ſpend in the *acquiſition*, and being deſirous to learn in the firſt place, only the moſt *neceſſary* parts of every branch of learning, have no time to ſpend upon all the various Figures which Planimetry affords; ſuch as Rhombus, Rhomboides, Oval, Parabola, Hyperbola, &c.

☞ This conſideration induced me to compile the Epitome: from which, thoſe who underſtand Arithmetic may acquire a tolerable knowledge of Land-Surveying; and thoſe who have properly ſtudied this ſubject, may preſently refreſh their memories, by finding compriſed in a *few* Pages, thoſe uſeful Rules and Directions, which, in larger Volumes, they may have to *hunt* after through ſeveral Hundred Pages.

To conclude, if what I have written, with the *view* of rendering a ſervice to the Publick, meets with their acceptation, I am ſatisfied. But if they diſcover any *errors*, either of the preſs, or pen, either in the plan, or execution, a line on *that* ſubject, addreſſed to J. VAUGHAN, *Grammar-School*, *Malpas*, will be thankfully received, and ſeriouſly attended to.

THE

THE

INTRODUCTION.

BEFORE I explain the following Tables, it may be neceſſary to obſerve, that their Uſes are limited to the purpoſes mentioned in the propoſals, viz. to aſcertain the contents in acres of any Farm, &c. As to plotting of Land, the moſt neceſſary inſtructions for that purpoſe will be found in the APPENDIX.

The firſt Column of every Page in each Table, contains the various Lengths of Fields; the ſecond Column ſhews the Breadth of ſuch Fields to contain the Quantities placed at the Head of that Column: but, becauſe theſe Breadths could not be expreſſed exactly, without making uſe of ſmaller fractions than quarters of yards, (which ſmaller fractions would not be underſtood by many for whom the book was deſigned,)

deſigned,) for the ſake of perſpicuity, I expreſſed the Breadths in yards and quarters only.

In the narrow Columns, under the words Exceſs, marked thus, (+) or Deficiency, marked thus (—) I have inſerted in Perches and quarters of Perches, the Exceſs or Deficiency of the Product of each Length and Breadth, if more or leſs than the quantity at the Head of the Column of Breadths: or, in other words, the Difference in Perches and quarters of Perches between the integral Quantities at the Head of the Columns, and ſuch quantities approximating nearly to them, as the tabular Lengths and Breadths when multiplied will produce. And, becauſe Quarters are fractions underſtood by *all*, wherever I met with any other fractions, as $\frac{1}{5}$, $\frac{3}{5}$, &c. I took the liberty of deviating a Square Yard or two, in order to expreſs the Exceſs or Deficiency in Perches and quarters of Perches; ſetting down $\frac{1}{4}$ for $\frac{1}{5}$, and $\frac{1}{2}$ for $\frac{3}{5}$, &c. But as the Exceſs and Deficiency are generally ſo ſmall as to be of little or no ſignification, the Exceſs happening, upon an average, as often as the Deficiency, and, *vice verſâ*, the Deficiency nearly as often as the Exceſs, theſe Columns are of little uſe, except in caſes of *very* great accuracy; but this is left to the Surveyor.

As in the firſt Column of every Page each Number is ſuppoſed to be a Length, I found I could not fill up an equal number of Columns of Breadths in the firſt right-hand Pages, without making uſe of ſuch numbers, as, relatively conſidered, were too great for Breadths; which was the reaſon of their omiſſion. But, it being requiſite for the readier underſtanding of Tables, that a ſimilarity ſhould be obſerved in their Pages, &c. I choſe rather for a few of the firſt Pages to the right-hand to be blank, than to fill them up with the Breadths of thoſe quantities, which, in all the ſucceeding Pages, would be found at the Heads of Columns in the right-hand Pages only.

In theſe Tables, the Dimenſions are taken in yards and quarters, and not in chains and links, becauſe the former are more generally underſtood by Farmers than the latter: beſides, that a chain is in few hands, whereas a yard is in every Houſe.

You may, if you have no Aſſiſtant, uſe a Rod two yards long, divided into quarters of a yard; and, to free you from the trouble and fatigue which attends ſtooping, there may be at the end by which you hold it, ſo much over and above the two yards, ſeparated from the reſt by a proper mark, as will cauſe the end which is fartheſt from you, to be exactly two yards from the toe of your right foot, as often as with an erect poſture of body you hold the other end to ſome part of your right ſide: always obſerving, as you proceed, to place the toe of your right foot exactly at the end of the extent meaſured with your rod: but the uſe of this rod is ſubmitted to the diſcretion of my Readers, as many Gentlemen and Farmers *ſtep* ſo regularly, as to be able to take the dimenſions with tolerable exactneſs that way. Others may prefer the uſe of a line, or chain, with marks at the end of every yard, and this may be the beſt way, if you think proper to have an Aſſiſtant.

To find the Content of a Field, &c. by the following Tables.

To do this, you need only meaſure the Length and Breadth; but, as all Fields are not quadrilateral, and many of thoſe which are ſo, vary conſiderably in their form from the ſquare, or parallelogram, vulgarly called a Long Square, to the meaſuring of which Figures the following Tables are peculiarly calculated, I ſhall firſt ſhew their uſe in finding the Contents of a Parallelogram; and afterwards of a Triangle, which is the half of a Parallelogram; to which two figures moſt Fields may be reduced by Prop. V. and Prop. VI. of the Appendix.

Example of a Parallelogram.

Let the Length of a Field be 406 yards, and its Breadth 200, what is its Content in Acres, &c.?

Look in the firſt Column of the Table for the Length 406 yards, then in ſome of the ſucceeding Columns for the Breadth: now when it happens, as in this Example, that the Breadth of your Field exceeds the tabular Breadths, you may proceed orderly by particulars, adding together the Quantities of as many different Breadths as are equal to the given Breadth; which Quantities, added together, will exactly correſpond with the ſum of their reſpective Breadths: or you may ſeek in the Table ſome Breadth, that is either exactly or nearly the half, third, or fourth of the given Breadth; which being doubled, trebled, &c. ſo as to make the given Breadth, will correſpond with the Quantity at the head of the Column, doubled, or trebled, in like manner. Thus, in the above example, as you cannot find 200 yards among the Breadths oppoſite to the Length 406 yards, you may ſeek the half, the neareſt tabular Breadth to which is 95 yards and 2 quarters, the Breadth of 8 Acres. This Breadth doubled is too little by 9 yards, being 191 yards: the Breadth of twice 8 Acres = 16, and the deficiency 9 yards being ſought among the Breadths in the ſame line, you find it under 3 Roods; ſo that the Contents of a Field 406 yards long and 200 yards broad, are about 16 Acres 3 Roods, by the tabular computation.

Another Method.

But as ſome perſons, who are ignorant of arithmetic, have ſuch an unconquerable averſion to any thing that looks like a calculation (ariſing from an over-timorous diſtruſt of their own capacities) as may perhaps render the Rules I have laid down of no ſervice to them, I ſhall recommend to them an obſervation, which will frequently occur to thoſe who are concerned in the buſineſs of education, "To believe a thing impoſſible is the only way to make it ſo." I ſhall, however, accommodate them with a method of performing the buſineſs in their own way, as follows:

Having meaſured the Length, and, as before directed, found it in the firſt Column, you will obſerve in the ſame line, that of a piece of Land 406 yards long, 12 yards in Breadth make 1 Acre: you may then meaſure the Breadth, counting as you proceed 1 Acre for every 12 yards, till you arrive at the end of your Breadth; thus, 12 yards, that is, 1 Acre; 12 yards more, that is 2 Acres; 12 yards more, that is 3 Acres, &c. &c. perhaps at laſt you have ſome number of yards leſs than 12, as 6, 4, 3, &c. then, among the ſmaller Breadths, you will find that 6 yards is 2 Roods, or half an Acre; 3 yards is 1 Rood, or a quarter of an Acre, &c.

Suppoſe the Field be of a triangular form, you may find the Contents of it out of the Tables, by calling the baſe, or longeſt ſide, the Length; and half the perpendicular the Breadth; then find its Contents as a parallelogram by the foregoing Directions.

Note. To know what is a Triangle, ſee the Epitome, Prop. III. Fig. 10, &c.

The above is ſufficient to ſhew you the nature of the Tables; a little practice and conſideration will give you a further inſight into their utility; the laſt thing, therefore, that I ſhall deſcribe at preſent, is,

The uſe of the Tables in laying out of Lands in the Form of a Square, Parallelogram, or Triangle.

PROPOSITION I.

To lay out a given quantity of Land in the form of a Square.

RULE.

RULE.

Look in the Table for the greateſt Breadth beneath the given Quantity, then find its oppoſite Length in the left-hand Column, and you will have a Figure, either exactly or nearly ſquare.

Example.

Suppoſe you would lay out 65 Acres in a ſquare Figure.

Beneath 65 Acres in Table II. you find, by comparing the Column of Breadths and Column of Lengths together, that the neareſt to each other are the greateſt Breadth 562 yards, and its Length 560 yards.

Another Example.

Suppoſe you would lay out 10 Acres in a ſquare Figure.

Look in the firſt Table under 10 Acres for its greateſt Breadth, which, by tracing its Breadths backwards, you will find is 220 yards, and its Length 220 yards, an exact ſquare.

PROP. II.

To lay out a given quantity of Land in the form of a Parallelogram.

RULE.

1. If the Length be given, find it in one of the left-hand Columns, oppoſite to which, and beneath the given Quantity, you will find the Breadth. Or,

2. If the Breadth be given, find that Breadth beneath the given Quantity, and in one of the left-hand Columns, oppoſite to the ſaid Breadth, you will find the Length.

Example.

What is the Breadth of a Parallelogram whoſe length is 200 yards, to contain 3 Acres?

Look in the firſt Table for 200 yards, oppoſite to which, and under 3 Acres, you have 72½ yards, the Breadth required. Again, *e contra*,

What is the Length of a Parallelogram containing 3 Acres of Land, whoſe Breadth is 72½ yards.

Look in the Table under 3 Acres for 72½ yards, its oppoſite Length in the left-hand Column is 200 yards.

PROP. III.

To lay out a Triangle by the Tables.

1. Having the Baſe given.

RULE.

Seek the Baſe in the left-hand Column; find its oppoſite Breadth beneath the given Quantity; double that, and you will have the Perpendicular required.

2. Having the Perpendicular given.

RULE.

Find the Perpendicular in the left-hand Column, double its oppoſite Breadth found under the given Quantity, and you will have the Baſe required.

Example I.

What muſt be the Perpendicular of a Triangle to contain 4 Acres, whoſe Baſe is 156 yards?

Find 156 in the left-hand Column, oppoſite to which beneath the given Quantity 4 Acres, you will find 124 yards; this doubled is 248, the Perpendicular required.

Example II.

What is the Baſe of a Triangle containing 4 Acres, whoſe Perpendicular is 248 yards?

Find 248 yards in the left-hand Column, and under 4 Acres you will find 78, which being doubled, you will have the Baſe required, viz. 156 yards.

Explanation of Algebraic Symbols and Fractional Expreſſions.

$+$ is uſed to expreſs *plus*, or more.

$-$ is uſed to expreſs *minus*, or leſs.

$=$ denotes equality.

$\frac{1}{4}$ ſignifies one fourth of any denomination to which it is annexed.

$\frac{1}{2}$ ſignifies one half of any thing.

$\frac{3}{4}$ ſignifies three fourths, or three quarters.

N. B. In the following Tables Bth. ſignifies Breadth, R. Roods, A. Acres, Y. Yards, Q. Quarters, and Per. Perches.

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TABLE FIRST.

Length.	Bth of 1 R.	Exceſs + or Deficiency —	Bth of 2 R	Exceſs + or Deficiency —	Bth. of 3 R.	Exceſs + or Deficiency —	Bth. of 1 A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q	PER.	Y. Q.	PER.	Y. Q.	PER.
40	30 1							
50	24		48 1					
60	20		40 1		60 2			
70	17 1		34 2		52	+ $\frac{1}{4}$		
72	17		33 2		50 2	+ $\frac{1}{4}$	67 1	
74	16 1		32 3		49		65 2	
76	16	— $\frac{1}{4}$	32	+ $\frac{1}{2}$	47 3		63 2	— $\frac{1}{2}$
78	15 2		31		46 2		62	
80	15	+ 1	30 1		45 1	— $\frac{1}{4}$	60 2	
82	14 3		29 2		44 1		59	
84	14 2	+ $\frac{1}{4}$	28 3		43 1		57 2	— $\frac{1}{4}$
86	14		28	— $\frac{1}{2}$	42 1		56 1	

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Length.	Bth. of 1 R.	Exceſs + or Deficiency −	Bth. of 2 R.	Exceſs + or Deficiency −	Bth. of 3 R.	Exceſs + or Deficiency −	Bth. of 1 A.	Exceſs + or Deficiency −	Bth. of 2 A.	Exceſs + or Deficiency −
Y	Y.Q.	PER.	Y.Q.	PER.	Y.Q.	PER.	Y.Q.	PER.	Y.Q.	PER.
88	13 3		27 2		41 1		55			
90	13 1		26 3	− ½	40 1		53 3			
92	13 1	+ ¼	26 1		39 2		52 2	+ ¼		
94	13		26	− ½	39 1		52 2			
96	12 2	− ¼	25 1		37 3		50 2			
98	12 1	− ¼	24 3	+ ¼	37		49 1	− ½	98 3	
100	12	− ¼	24 1		36 1		48 2		96 3	
102	11 3	− ½	23 3		35 2	− ¼	47 2		95	+ ¼
104	11 2	− ½	23 1		35	+ ½	46 2		93	
106	11 2	+ ½	22 3	− ¼	34 1		45 2	− ¼	91 1	
108	11 2		22 2	− ¼	33 2	− ¼	44 3		89 2	− ¼
110	11		22		33		44		88	

Length.	Bth. of 1 R.	Exceſs + or Deficiency —	Bth. of 2 R.	Exceſs + or Deficiency —	Bth. of 3 R.	Exceſs + or Deficiency —	Bth of 1 A.	Exceſs + or Deficiency —	Bth. of 2 A.	Exceſs + or Deficiency —	Bth. of 3 A.	Exceſs + or Deficiency —
Y.	Y. Q	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
112	10 3		21 2	— ½	32 2	+ ½	43 1		86 2	+ ¼		
114	10 2	+ ½	21 1		31 3	+ ¼	42 2		84 3	+ ½		
116	10 2	+ ¼	20 3	— ½	31 1		41 3		83 2			
118	10 1		20 2		30 3		41		82	— ¼		
120	10	— ¼	20	— ½	30 1		40 2	+ ¾	80 2	— ½	121	
122	10	+ ¼	20	+ ¾	29 3		39 3	+ ¼	79 2	+ ½	119	
124	9 3		19 2		29 1		39	— ½	78	— ¼	117	— ½
126	9 2	— ½	19 1		28 3	— ¼	38 2	+ ¼	76 3	— ¼	115 1	
128	9 2	+ ¼	19	+ ½	28 1	— ½	37 3	— ¼	75 2	— ½	113 2	+ ½
130	9 1	— ¼	18 2	— ½	28	+ ¼	37 1		74 2		111 3	
132	9 1	— ¼	18 2	+ ¾	27 2		36 3	— ½	73 1	— ¼	110	+ ¼
134	9		18		27	— ½	36 1	+ ½	72 1		108 1	— ½

Length.	Bth. of 1 R.	Exceſs + or Deficiency —	Bth. of 2 R	Exceſs + or Deficiency —	Bth. of 3 R.	Exceſs + or Deficiency —	Bth of 1 A.	Exceſs + or Deficiency —	Bth. of 2 A.	Exceſs + or Deficiency —	Bth. of 3 A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
136	9	+ ½	17 3	— ¼	26 2	— ½	35 2	— ½	71 1	— ¼	106 3	— ¼
138	8 3		17 2		26 1		35		70	— ½	105 1	+ ½
140	8 3	— ½	17 1		26	+ ¼	34 2	— ¼	69 1	+ ½	103 3	
142	8 2		17		25 2	— ¼	34	— ¼	68 1	+ ½	102 1	
144	8 2	+ ½	16 3	— ¼	25 1		33 2		67 1		100 3	— ¼
146	8 1	— ¼	16 2	— ½	24 3	— ¼	33 1	+ ¼	66 2	+ ½	99 2	— ½
148	8	— ¾	16 2	+ ½	24 2		32 3		65 2	+ ½	98	— ½
150	8	— ¼	16 1	+ ½	24 1		32 1		64 2	— ¼	97	+ 1
152	8		16	+ ½	24	+ ½	32	+ ¾	63 3		95 2	
154	8	+ ¾	15 3	— ¼	23 2	— ½	31 2	+ ½	63	+ ½	94 1	
156	7 3		15 2		23 1		31		62		93	
158	7 3	+ ½	15 1	+ ¼	23		30 2	+ ¾	61 1		92	+ ½

Length.	Bth. of 4 A.		Excefs + or Deficiency —	Bth. of 5 A.		Excefs + or Deficiency —
Y.	Y.	Q.	PER.	Y.	Q.	PER.
136						
138						
140	138	1				
142	136	1	— ¼			
144	134	2	— ½			
146	132	3	— ¼			
148	130	3	— ¼			
150	129	1	+ ½			
152	127	1	— ½			
154	125	3				
156	124			155		
158	122	2	— ¼	153	1	+ ¼

Length.	Bth. of 1 R.		Excess + or Deficiency −	Bth. of 2 R.		Excess + or Deficiency −	Bth. of 3 R.		Excess + or Deficiency −	Bth. of 1 A.		Excess + or Deficiency −	Bth. of 2 A.		Excess + or Deficiency −	Bth. of 3 A.		Excess + or Deficiency −
Y.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER	Y.	Q.	PER.	Y.	Q.	PER.
160	7	2	− ¼	15	1	+ ¾	22	3	+ ¼	30	1		60	2		90	3	
162	7	2		15		+ ¼	22	2	+ ½	29	3	− ¾	59	3		89	3	+ ½
164	7	2	+ ¾	14	3		22	1	+ ¾	29	2		59		+ ¼	88	2	
166	7	1	− ¼	14	2	− ½	22		+ ¾	29		− ¾	58	2	+ 1	87	2	
168	7	1	+ ¼	14	2	+ ½	21	2	− ½	28	3	− ¼	57	2	− ½	86	2	− ½
170	7		− ¾	14	1	+ ¼	21	1	− ½	28	2	+ ¼	57		+ ¾	85	1	− ½
172	7		− ¼	14		− ½	21	1	+ ¾	28	1	− ½	56	1	− ¼	84	2	
174	7		− ¼	14		− ½	21		+ ¾	27	3	− ¼	55	2	− ¾	83	2	− ¼
176	6	3	− ¾	13	3		20	2	− ¾	27	2		55		+ ¼	82	2	+ ¼
178	6	3	− ¼	13	2	− ½	20	2	+ ½	27	1	+ ¼	54	2	+ ½	81	2	− ½
180	6	3	+ ¼	13	2	+ ¼	20	1	+ ½	27		+ ¾	53	3		80	3	+ ½
182	6	3	+ ½	13	1		20		+ ½	26	2	− ¼	53		− ¾	79	3	− ¼

Length.	Bth. of 4 A.	Exceſs + or Deficiency —	Bth of 5 A.	Exceſs + or Deficiency —	Bth. of 6 A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER	Y. Q.	PER.
160	121		151 1			
162	119 2	— ¼	149 2	+ ½		
164	118		147 2	+ ½		
166	116 3	+ ½	145 3	— ¼		
168	115 1		144	— ¼		
170	113 3		142 1		170 3	+ ½
172	112 3	— ½	140 3	— ¼	169	+ ¼
174	111 1		139		167	+ ¼
176	110	+ ½	137	+ ½	165	+ ¾
178	108 3	— ¼	136		163 1	+ ¼
180	107 2		134 2	+ ½	161 1	
182	106 1		132 3	+ ¼	159 1	— ½

Length.	Bth. of 1 R.	Excess + or Deficiency —	Bth. of 2 R.	Excess + or Deficiency —	Bth. of 3 R.	Excess + or Deficiency —	Bth. of 1 A.	Excess + or Deficiency —	Bth. of 2 A.	Excess + or Deficiency —	Bth. of 3 A.	Excess + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
184	6 2	— 1/2	13 1	+ 1/2	19 3		26 1	— 1/2	52 3	+ 1/2	79	+ 1/4
186	6 2		13		19 2		26		52	— 1/4	78	— 1/2
188	6 2	+ 1/2	13	+ 3/4	19 1	— 1/2	25 3		51 2	+ 1/4	76 2	— 1/2
190	6 1	— 3/4	12 3		19	— 3/4	25 2		51	+ 1/4	76 2	— 1/2
192	6 1	— 1/4	12 2	— 1/4	19	— 1/2	25 1	+ 1/4	50 2	+ 1/2	75 2	— 3/4
194	6 1		12 2	+ 1/4	18 3		25	+ 1/4	50	+ 1/2	74 3	— 1/2
196	6 1	+ 1/2	12 1	— 1/2	18 2		24 3	+ 1/2	49 2	+ 1/2	74	— 1/2
198	6	— 3/4	12 1		18 1	— 1/2	24 2	+ 1/4	49	+ 3/4	73 1	— 1/2
200	6	— 1/4	12	— 3/4	18 1	+ 3/4	24 1	+ 1/4	48 2	+ 3/4	72 2	— 3/4
202	6		12		18		24	+ 1/4	48	+ 1/2	72	+ 3/4
204	6	+ 1/2	12	+ 1/4	17 3	— 1/4	23 3	+ 1/4	47 2	+ 1/4	71 1	+ 1/2
206	6	+ 1	12 3		17 3	+ 1	23 2		47		70 2	

Length.	Bth. of 4 A.	Exceſs + or Deficiency —	Bth. of 5 A.	Exceſs + or Deficiency —	Bth. of 6 A.	Exceſs + or Deficiency —	Bth. of 7 A.	Exceſs + or Deficiency —	Bth. of 8 A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q,	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
184	105 1		131 2	— ½	158	+ ½	184 1			
186	104	— ½	130	— ¾	156	— ¾	182	—1		
188	103	+ ¾	128 2	— ¼	154 1	— ½	180	— ¼		
190	102	+ ½	127 2	+ ½	153	+ ¾	178 1	— ¾		
192	101	+1	126		151 1		176 2			
194	99 3	— ¼	124 3		149 2	+ ¾	174 3	+ ¾		
196	98 3		123 2		148 1	+ ½	172 3	+ ¾		
198	97 3		122 1		146 3	+ ½	170		195 2	— ¼
200	96 3	— ¼	121		145 1	+ ¼	169 2	+ ¾	193 2	— ¾
202	96	+1	120	+1½	144	+1½	168	+1¾	192 2	+2
204	95	+ ¾	118 3	+ ¾	142 2	+1	166	— ½	190	+1¼
206	94	+ ¼	117 2	+ ½	141	+ ½	164 2	+ ½	188	+ ½

Length.	Bth. of 1 R.	Exceſs + or Deficiency —	Bth of 2 R.	Exceſs + or Deficiency —	Bth. of 3 R.	Exceſs + or Deficiency —	Bth. of 1 A.	Exceſs + or Deficiency —	Bth. of 2 A.	Exceſs + or Deficiency —	Bth. of 3 A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
208	6	+ 1¼	11 3	+ ¾	17 2	+ ¼	23 1		46 2	— ¼	70	+ 1¼
210	5 3		11 2		17 1	— ¼	23	— ¼	46	— ½	69 1	+ 1
212	5 3	+ ¼	11 2	+ ¾	17 1	+ ¾	23	+ 1	45 3	+ ¾	68 2	
214	5 3	+ ¼	11 2	+ ¼	17		23	+ 2¼	45 1		68	+ ½
216	5 2	+ ¾	11 1	+ ¼	16 2	— ¼	22 2	+ ¾	45	+ 1½	67 1	+ ¼
218	5 2	— ½	11	— ¾	16 3	+ ¾	22 1	+ ¼	44 2	+ ½	67	+ 2¼
220	5 2		11		16 2		22		44		66	
222	5 2	+ ¼	11	+ ¾	16 2	+ 1	22	+ ½	43 2	— ¾	65 2	+ ¾
224	5 2	+ ¾	11	+ 1½	16 1	+ ½	21 2	— ¾	43 1	+ ¼	66	
226	5 2	+ 1	10 3	+ ½	16	— ¼	21 2	+ ¾	43	+ 1½	64 1	+ ½
228	5 1	— ½	10 2	— ¾	16	— ½	21 1		42 2	+ ¼	63 3	+ ½
230	5 1		10 2		15 3	— ½	21	— ½	42	— ½	63 1	+ ½

Length.	Bth. of 4 A.	Exceſs + or Deficiency −	Bth. of 5 A.	Exceſs + or Deficiency −	Bth. of 6 A.	Exceſs + or Deficiency −	Bth. of 7 A.	Exceſs + or Deficiency −	Bth. of 8 A.	Exceſs + or Deficiency −	Bth. of 9 A.	Exceſs + or Deficiency −	Bth. of 10 A.	Exceſs + or Deficiency −
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
208	93	− ½	116 2	+ 1	139 2	− ¾	163	+ 1	186 1	+ ¾	209 2	+ ¼		
210	92 1	+ ½	115 1	+ ¼	138 1		161 1	− ¼	184 2	+ 1¼	207 2	+ 1		
212	91 2	+ 1¼	114 1	+ ¾	137	+ ¼	160	+ 1½	186 1	+ ¾	205 2	+ ¼		
214	90 2	− ½	113 1	+ ¼	136	+ 1	158 2		184 2	+ 1½	203 3			
216	89 2	− ¾	112		134 2		156 3	− ½	182 2	− ¾	201 2	− ¾		
218	89	+ ¾	111	− ¾	133 2	+ ¾	155 2	− ½	181 1	+ 1	200	+ 1¼		
220	88		110		132		154		179 1		198		220	
222	87 1	+ ¼	109		131	+ 1½	152 2	− ¾	177 3		196 1	+ ¼	218	
224	86 2	+ ½	108		129 3	+ ¾	151 1		176		194 2	+ ½	216	− ¼
226	85 2	− ¾	107		128 2	+ ¾	150	+ ½	174 2	+ ¾	192 2	− ¾	214	− 1¼
228	85	+ ¾	106 1	− ¾	127 2	+ 1	148 2	− ¾	173	+ 1	191		212 1	− ¼
230	84 1	+ ½	105 1	+ ½	126 1		147 1	− ¼	171 1	+ ½	189 2	+ 1	210 2	+ ¾

Length.	Bth. of 1 R.	Excess + or Deficiency —	Bth. of 2 R.	Excess + or Deficiency —	Bth. of 3 R.	Excess + or Deficiency —	Bth. of 1 A.	Ex cess + or Deficiency —	Bth of 2 A.	Excess + or Deficiency —	Bth. of 3 A.	Excess + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
232	5 1	+ ¼	10 2	+ ½	15 3	+ ¾	21	+ 1	41 3	+ ½	62 2	
234	5 1	+ ½	10 1	+ ¾	15 2		20 3	+ ½	41 1	— ¾	62	— ¼
236	5 1	+ ¾	10 1		15 2	+ 1	20 2		41	+ 1	61 2	+ ½
238	5	— ¾	10 1	+ ½	15 1		20 1	— ½	40 3	+ ¾	61	
240	5	— ¼	10	— ½	15 1	+ 1	20 1	+ ¾	40 1	— ½	60 2	
242	5		10		15		20		40		60	
244	5	+ ¼	10	+ ½	15	+ 1	20	+ 1¼	39 3	+ ½	59 2	
246	5	+ ½	10	+ 1¼	14 3		19 3	+ ½	39 2	— 1¼	59	
248	4 3	— 1	9 3		14 3	+ ¾	19 2		39	— ¼	58 2	— ½
250	4 3	— ¾	9 3	+ ½	14 2		19 2	+ 1¼	38 3	+ ½	58	— ¾
252	4 3	— ½	9 2	— ¾	14 2	+ ¾	19 1	+ ½	38 2	+ ¾	57 2	— ¾
254	4 3		9 2	— ¼	14 1	— ½	19	— ½	38 1	+ 1	57 1	+ ¼

Length.	Bth. of 4 A.	Excess + or Deficiency —	Bth. of 5 A.	Excess + or Deficiency —	Bth. of 6 A.	Excess + or Deficiency —	Bth. of 7 A.	Excess + or Deficiency —	Bth. of 8 A.	Excess + or Deficiency —	Bth. of 9 A.	Excess + or Deficiency —	Bth. of 10A.	Excess + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
32	83 2	+ 1	104 1	+ ¼	125	+ ¼	146	+ ¾	166 3	— ¼	187 2	— ½	208 2	+ ¾
34	82 3	+ ¼	103 2	+ ¾	124	— ½	144 3		165 2	+ ½	186	— ¾	207	+ 1½
36	82	+ ½	102 2	+ ¾	123	+ 1	143 2	+ 1	164	+ 1¼	184 1	— 1/5	205	+ 1½
38	81 2	+ 1¼	101 3	+ ½	122		142 2	+ 1¼	162 3	+ ½	183	+ ¼	203 1	— ¾
40	80 3	+ ¾	100 3	— ½	121	+ ¼	141 1	+ 1	161 1	— ¼	181 2	+ ½	201 2	— ¾
42	80		100		120		140		160		180		200	
44	79 2	+ 1	99 1	+ ½	119	— ¼	137	+ 1	158 3	+ ¼	178 2	— ½	198 2	+ ¾
46	78 3	+ ½	98 2	+ 1¼	118		137 3	+ ½	157 1	— ¾	177	— ¼	196 3	+ ½
48	78	— ¾	97 2	— ¾	117 1	+ 1	136 3	+ 1	156 1	+ ¾	175 3	+ ½	195 1	+ ½
50	77 2	+ ½	96	+ 1¼	116 1	+ ¾	135 2	— ¼	155	+ 1	174 1		193 2	— ¾
52	76 3	— ½	96	— ¼	115 1	+ ½	134 2	+ ¾	153 2	— ¾	173	+ 1¾	192	
54	76 1	+ ½	95 1	— ¾	114 2	+ ¾	133 2		152 2	— ½	171 3	+ 1	190 3	— ½

Length.	Bth. of 1 R.	Exceſs + or Deficiency —	Bth. of 2 R.	Exceſs + or Deficiency —	Bth. of 3 R.	Exceſs + or Deficiency —	Bth. of 1 A.	Exceſs + or Deficiency —	Bth. of 2 A.	Exceſs + or Deficiency —	Bth. of 3 A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
256	4 3	— ¼	9 2	+ ½	14 1	+ ½	18 3	— ½	37 2	— ¾	56 2	+ ¾
258	4 3	+ ½	9 2	+ 1	14	— ½	18 3		37 2	— ¼	56 1	— ¼
260	4 3	+ ¾	9 1	— ½	14	+ ½	18 2	— ¾	37 1	+ ½	56	+ 1¾
262	4 2	— 1	9 1		14	+ 1½	18 2	+ ¼	37	+ ¼	55 2	+ ¾
264	4 2	— ¾	9 1	+ ¾	13 3		18 2	+ 1¾	36 3	+ 1	55	+ ¼
266	4 2	— ½	9	— ¾	13 3	+ 1	18 1	+ ½	36 2	+ 1	54 3	+ 1¼
268	4 2		9	— ¼	13 2	— ½	18	— ½	36 1	+ 1	54 1	+ ½
270	4 2	+ ¼	9	+ ¼	13 2	+ ½	18	+ ½	36	+ 1½	53 3	— ¼
272	4 2	+ ½	9	+ 1	13 2	+ 1¼	17 3	— ¼	35 2	+ 1	53 2	+ 1
274	4 2	+ ¾	9	+ 1¼	13 1		17 3	+ ½	35 2	+ 1¼	53	— ¼
276	4 2	+ 1	8 3		13 1	+ 1	17 2	— ¼	35	— ½	52 3	+ 1¼
278	4 2	+ 1¼	8 3	+ ½	13	+ ½	17 2	+ ¾	35	+ 1¾	52 1	+ ¼

Length.	Bth. of 4 A.	Exceſs + or Deficiency −	Bth. of 5 A.	Exceſs + or Deficiency −	Bth. of 6 A.	Exceſs + or Deficiency −	Bth. of 7 A.	Exceſs + or Deficiency −	Bth. of 8 A.	Exceſs + or Deficiency −	Bth. of 9 A.	Exceſs + or Deficiency −	Bth. of 10 A	Exceſs + or Deficiency −
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
256	75 1	+ ¼	94	− ¼	113	+ 1½	131 3	+ 1	150 2	+ ½	169 1	+ ¼	188	− ½
258	75	+ ¼	93	+ 1¾	112 2	− ½	131 1	− ½	150	− ¾	169	+ 1½	187 2	− ¾
260	74 2	+ ¾	93		111 2	− ¾	130 1	+ ½	149	+ 1¾	167 2		186	
262	74	+ ¾	92 2	+ 1¼	111	+ 1½	129 1	− ½	147 3	− ¼	166 1		184 3	+ ¼
264	73 1	+ ¼	91 2	− 1	110	+ ¾	128 1		146 2	− 1	165	+ 1	183 1	+ ½
266	73	+ 1¾	91		109 1	+ ½	127 2	+ 1	145 3	+ 1½	164	+ 1¾	182	+ ¼
268	72 1		90 1	− ½	108 2	+ 1	126 2	+ ¾	144 2	+ 1½	162 2	− ¼	180 2	− 1
270	71 3	+ ½	89 3	+ 1	107 2	− ½	125 2		143 2	+ ¾	161 2	+ 1¼	179 1	+ ¼
272	71 1	− ¾	89	+ ¼	106 3	+ ¼	124 2	− ½	142 2	+ 1¼	160 1	+ 1	178	+ ½
274	70 3	+ ¼	88 2	+ 1	106	− ¾	123 3		141 2	+ ½	159	+ 1	177	+ 1¾
276	70 1	+ 1	87 3	+ ½	105 1	+ ¼	124 3		140 1	− ¼	158	+ 1½	175 2	+ 1
278	69 2	− 1	87	− ¼	104 2	− ½	122	+ 1¼	139 1		156 3	+ ¾	174	− ¾

Length.	Bth. of 1 R	Excess + or Deficiency −	Bth. of 2 R.	Excess + or Deficiency −	Bth. of 3 R.	Excess + or Deficiency −	Bth. of 1 A	Excess + or Deficiency −	Bth. of 2 A.	Excess + or Deficiency −	Bth. of 3 A.	Excess + or Deficiency −
Y.	Y. Q	PER.	Y. Q	PER.	Y. Q.	PER.	Y. Q	PER.	Y. Q.	PER	Y. Q.	PER.
280	4 2	+1¾	8 3	+1	13	+ ¼	17 1	− ½	34 2	− ¾	52	+1½
282	4 1	− ½	8 2	− ¾	13	+1	17 1	− ¾	34 2		51 2	− ¼
284	4 1		8 2	− ¼	12 3	− ¼	17	− ½	34	− ¾	51 1	+1
286	4 1	+ ¼	8 2	+ ½	12 3	+ ½	17	+ ¾	34	+1½	50 3	− ¼
288	4 1	+ ½	8 2	+1	12 2	−1	16 3	− ½	33 2	−1	50 2	+ ¾
290	4 1	+ ¾	8 2	+1½	12 2	− ½	16 3	+ ½	33 2	+1	50 1	+1½
292	4 1	+1½	8 2	− ½	12 2	+ ¾	16 2	− ¾	33 1	−1	49 3	
294	4 1	+1½	8 1	+ ¼	12 2	+ ¾	16 2	+ ½	33	+ ¾	49 2	+1
296	4	− ¾	8 1	+ ¾	12 1		16 2	+1½	32 3	+ ½	49	− ½
298	4	− ½	8 1	+1½	12 1	+ ¾	16 1		32 2		48 3	
300	4	− ¼	8	− ½	12	−1	16 1	+1½	32 1		48 2	+1
302	4		8		12	− ¼	16	− ¼	32	− ½	48	− ¾

Length.	Bth. of 4 A.	Exceſs + or Deficiency —	Bth. of 5 A.	Exceſs + or Deficiency —	Bth. of 6 A.	Exceſs + or Deficiency —	Bth. of 7 A.	Exceſs + or Deficiency —	Bth. of 8 A.	Exceſs + or Deficiency —	Bth. of 9 A.	Exceſs + or Deficiency —	Bth. of 10 A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q	PER	Y. Q.	PER	Y. Q.	PER.	Y. Q.	PER.	Y. Q	PER.
280	69 1	+1	86 2	+ ¾	103 3	+ ¼	121		138 1	— ¼	155 2	— ½	173	+1½
282	68 3	+1	86	+1¾	103	+ ¼	120 1	+ 1	137 1	— ½	154 2	+ ½	171 2	—1
284	68 1	— ¾	85 1	+ ½	102 1		119 1	— ½	136 1	— ¾	153 2	+1	170 2	— ¾
286	67 3	+ ½	84 3	+1½	101 2	— ¼	118 2	+ ½	135 2	+1	152 2	— ½	169 1	
288	67 1		84	— ¼	101	+1½	117 3	+1	134 2	+ ½	151 1		168	— ½
290	67	+2	83 2		100 1	+ ½	117	+ ¾	133 3	+1½	150 2	+1¾	167	— ¼
292	66 2	+2	83	+1	99 2	+ ¼	116	— ¼	132 2	—1	149		165 3	— ¼
294	66 3	+1	82 2	+2	98 3	— ¼	115 1	— ¼	131 3	+ ¼	148 1	+1	164 3	+1¼
296	65 2	+1	81 3	— ½	98	—1	114 2	+ ½	131	+2	147 1	+1	163 2	
298	65	+ ½	81 1	— ½	97 2	— ½	113 3	+ ½	130	+ ¾	146 1	+ ½	162 2	+ ¾
300	64 2	— ¼	80 3	+1	96 3	— ½	113	+ ¾	129	— ½	145 1	+ ½	161 2	+1¾
302	64	—1	80 1	+1¼	96 1	+1	112 1	+1	128 1	+ ½	144 1	+ ¼	160	

Length.	Bth. of 1 R.	Exceſs + or Deficiency −	Bth. of 2 R.	Exceſs + or Deficiency −	Bth. of 3 R.	Exceſs + or Deficiency −	Bth. of 1 A.	Exceſs + or Deficiency −	Bth. of 2 A.	Exceſs + or Deficiency −	Bth. of 3 A.	Exceſs + or Deficiency −
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
304	4	+ ¼	8	+ ½	12	+ ½	16	+ ¾	32	+ 1½	47 3	
306	4	+ ½	8	+ 1	12	+ 1½	16	+ ½	31 3	+ 1¼	47 2	+ ½
308	4	+ ¾	7 3	− 1	11 3	+ ¼	15 3	+ ½	31 2	+ ¾	47 1	+ 1
310	4	+ 1	7 3	− ½	11 3	+ 1½	15 2	+ ½	31 1	+ ½	46 3	− ½
312	4	+ 1¼	7 3		11 3	+ 1¼	15 2		31	− ¼	46 2	− ¼
314	4	+ 1½	7 3	+ ½	11 2	− ½	15 2	+ 1	31	+ 1¾	46 1	
316	4	+ 1¾	7 3	+ 1	11 2		15 2	+ 2	30 3	+ 1¼	46	+ ½
318	4	+ 2	7 3	+ 1½	11 2	+ 1	15 1	+ ¼	30 2	+ ½	45 3	+ 1
320	3 3	− ¼	7 2	− ½	11 2	+ 1½	15 1	+ 1¼	30 1		45 2	+ 1¼
322	3 3		7 2	− ¼	11 1	− ¼	15	− ½	30	− ¾	45 1	+ 1¼
324	3 3		7 2	+ ¼	11 1	+ 1½	15	− ½	30	+ 1¼	45	− 2
326	3 3	+ ¼	7 2	+ ¾	11 1	+ 1	15	+ 1½	29 3		44 2	− 1¼

Length.	Bth. of 4 A.	Exceſs + or Deficiency —	Bth. of 5 A.	Exceſs + or Deficiency —	Bth. of 6 A.	Exceſs + or Deficiency —	Bth. of 7 A.	Exceſs + or Deficiency —	Bth. of 8 A.	Exceſs + or Deficiency —	Bth. of 9 A.	Exceſs + or Deficiency —	Bth. of 10 A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
304	63 3	+ ¾	79 2	—1	95 2	— ¼	111 2	+ ½	127 2	+1¼	143 1	+ ½	159 1	+1
306	63 1	— ¼	79	— ¾	95	+1	110 3	+ ¼	126 2	— ¼	142 2	+1½	158 1	+ ¾
308	63	+1½	78 2	— ¾	94 1	— ¼	110		125 3	+ ½	141 2	+ ¾	157 1	+1
310	62 2	+1	78		92 3	+1½	109 1	—1½	124 3	— ½	140 2	+1	156	
312	62	— ½	77 2	— ½	93	— ¾	108 2	— ¾	124	—1	139 3	+1½	155 1	+1¼
314	61 3	+1	77	— ¾	92 2	+ ¼	108	+1	123 2	+2	138 3	+ ¼	154 1	+1
316	61 1		76 2	— ¾	92	+1	107 1	+ ½	122 2	— ¼	137 3	—1	153 1	—1
318	61	+1¼	76	—1	91 2	1¾	106 2	— ½	121 3		133	+ ¼	152 1	+ ½
320	60 2		75 2	—1¼	90 3		106	+1¼	121		136	—1¼	151 1	
322	63 1	+ ¾	75 1	+ ¼	90 1	+1	105 1	— ½	120 2	+1½	135 2	+1	150 2	+ ¾
324	59 3		74 3	+ ¾	89 3	+1¼	104 2	— ¾	119 2		134 2	+ ¾	149 2	+1¾
326	59 2	+ ¼	74 2	+1½	89 1	+ ¼	104	—1	119	+ ½	134	+1¾	148 3	+ ½

Length.	Bth. of 1 R.	Excefs + or Deficiency −	Bth. of 2 R.	Excefs + or Deficiency −	Bth. of 3 R.	Excefs + or Deficiency −	Bth. of 1 A.	Excefs + or Deficiency −	Bth. of 2 A.	Excefs + or Deficiency −	Bth. of 3 A.	Excefs + or Deficiency −
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
328	3 3	+ ¾	7 2	+ 1¼	11	− ¾	14 3		29 2		44 1	− ¼
330	3 3	+ ¾	7 2	+ 1	11		14 3	+ ¾	29 2	+ 1	44	
332	3 3	+ 1	7 1	− ½	11	+ ½	14 2	− 1	29 1	+ ¾	43 3	− ½
334	3 3	+ 1¼	7 1		11	+ 1½	14 2		29	+ ¼	43 2	+ ½
336	3 3	+ 1¾	7 1	+ ½	11	+ 2¼	14 2	+ 1	29	+ 2¼	43 1	
338	3 2	− 1	7 1	+ 1	10 3		14 2	+ 2	28 3	+ 1¼	43	+ ½
340	3 2	− ½	7 1	+ 1½	10 3	+ ¾	14 1	+ ¼	28 2	+ ¼	42 3	+ ½
342	3 2	− ½	7	− ¾	10 3	+ 1½	14 1	+ 1¼	28 1	− ½	42 2	+ ½
344	3 2	− ¼	7	− ¼	10 2	− ½	14	− ¾	28 1	+ 1¼	42 1	+ ½
346	3 2		7		10 2		14		28	+ ¼	42	+ ¼
348	3 2	+ ¼	7	+ ½	10 2	+ ¾	14	+ 1	28	+ 2¼	41 3	+ ½
350	3 2	+ ½	7	+ 1	10 2	+ 1½	14	+ 2	27 3	+ 1	41 2	+ ¼

Length.	Bth. of 4 A.	Exceſs + or Deficiency —	Bth. of 5 A.	Exceſs + or Deficiency —	Bth. of 6 A.	Exceſs + or Deficiency —	Bth. of 7 A.	Exceſs + or Deficiency —	Bth. of 8 A.	Exceſs + or Deficiency —	Bth. of 9 A.	Exceſs + or Deficiency —	Bth. of 10A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
328	59	— ¼	73 3	— ¼	88 2	— ¼	103 1	— ½	118	— ½	133	+2	147 2	— ¾
330	58 3	+ ¾	73 2	+1¾	88		102 3	+1	117 2	+1¾	132		146 3	+1
332	58 2	+1½	73	+ ½	87 2	— ½	102 1	+1¼	116 3	+ ¼	131 1	+2¼	146	+2¼
334	58	+ ½	72 2	+ ½	87	+ ½	101 2	+ ¾	116	+1	130 2	+ ¾	145	+1
336	57 2	—1¼	72	— ¼	86 2	+ ¾	101	+1¾	115 1	+ ¼	129 3	+1¼	144	— ½
338	57 1	— ¼	71 2	—1	86	+ ½	100 1	+ ¼	114 2	— ½	128 3	— ¼	143 1	+ ½
340	57	+ ¾	71 1	+ ¾	85 2	+1	99 3	+1¼	114	+1¼	128 1	+1¼	142 2	+1¾
342	56 3	—1¾	70 3		85	+1	99	— ½	113 1	+ ½	127 2	+1½	141 2	— ¼
344	56 1	— ¼	70 2	+1¾	84 2	+1	98 2	+ ¼	112 2	— ½	126 3	+1¾	140 3	+ ¾
346	56	+ ½	70	+ ¾	84	+ ¾	98	+1	112	+1¼	126	+1¼	140	+1¼
348	55 3	+1¼	69 2	— ½	83 2	+ ½	97 2	+1¾	111 1		125 1	+1	139	—1
350	55 2	+2¼	69 1	+1¼	83	+ ¼	96 3	— ½	110 3	+1½	124 2	+ ½	138 1	— ¼

Length.	Bth. of 1 R.	Exceſs + or Deficiency —	Bth. of 2 R.	Exceſs + or Deficiency —	Bth. of 3 R.	Exceſs + or Deficiency —	Bth. of 1 A.	Exceſs + or Deficiency —	Bth. of 2 A.	Exceſs + or Deficiency —	Bth. of 3 A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
352	3 2	+ ¾	7	+1½	10 1	— ½	13 3		28	+1¼	41 1	
354	3 2	+1	7	+1¾	10 1		13 3	+1	27 2	+1¾	41	
356	3 2	+1¼	6 3	— ½	10 1	+ ¾	13 2	—1	27 1	+ ¾	40 3	— ¼
358	3 2	+1½	6 3		10 1	—1¼	13 2	— ¼	27	— ½	40 2	— ¾
360	3 2	+1¾	6 3	+ ¼	10	—1	13 2	+ ¾	27	+1½	40 2	+2
362	3 2	+2	6 3	+ ¾	10	— ¼	13 2	+1¾	26 3		40 1	+1¾
364	3 1	— ¾	6 3	+1¼	10	+ ¼	13 1	— ½	26 2	—1	40	+1¼
366	3 1	— ½	6 3	+1¾	10	+1	13 1	— ¼	26 1	— ½	39 3	+1
368	3 1	— ½	6 2	— ¾	10	+1¾	13 1	+1¼	26 1	— ½	39 2	+ ½
370	3 1	— ¼	6 2	— ½	10	+2½	13	—1	26 1	+1	39 1	
372	3 1		6 2		9 3		13		26	— ¼	39	— ½
374	3 1	— ¼	6 2	— ¼	9 3	+ ½	13	+ ¾	26	+1½	39	+2¼

Length.	Bth. of 4 A.	Exceſs + or Deficiency —	Bth. of 5 A.	Exceſs + or Deficiency —	Bth. of 6 A.	Exceſs + or Deficiency —	Bth. of 7 A.	Exceſs + or Deficiency —	Bth. of 8 A.	Exceſs + or Deficiency —	Bth. of 9 A.	Exceſs + or Deficiency —	Bth. of 10 A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
352	55	+ ¼	68 3	+ ¼	82 2	+ ¼	96 1	+ ½	110	— ½	123 3	+ ½	137 2	+ ½
354	54 3	+ ¾	68 2	+1¾	82	— ¼	95 3	+ ½	109 2	+1¾	123	— ½	136 3	+ ¼
356	54 2	+1¼	68	+ ¼	81 2	— ¾	95 1	+1	108 3		122 2	+1¼	136	+ ½
358	54	—1	67 3	+1¾	81 1	+1½	94 3	+1¼	108 1	+1	121 3	+ ¾	135 1	+ ½
360	53 3		67 1	+ ½	80 3	+1¼	94	—1	107 2	— ¼	121	+2	134 2	+1¼
362	53 2	+ ¼	67	+1¾	80 1	+ ¼	93 2	—1	107	+ ½	120 2	+2	133 3	+ ½
364	53 1	+ ¾	66 2	+ ¼	79 3	— ¼	93	— ¾	106 2	+1½	119 3	+1	133	+ ½
366	53	+1¼	66 1	+1½	79 2	+1¾	92 2	+ ¾	106	+2½	119	+ ¼	132 1	
368	52 3	+1¾	65 3		79	+1	92	— ¾	105 1	+1½	118 2	+1½	131 2	—1¼
370	52 2	+2¼	65 2		78 2	+ ¼	91 2	— ¾	104 3	—1¼	117 3	+ ¼	131	+2½
372	52	— ½	65	— ½	78	— ¾	91	—1	104	—1	117	—1	130	—1¼
374	51 3	— ¼	64 3	+ ½	77 3	+1¼	90 2	—1	103 2	— ¼	116 2	+ ½	129 2	+1

Length.	Bth. of 1 R.		Excess + or Deficiency —	Bth. of 2 R.		Excess + or Deficiency —	Bth. of 3 R.		Excess + or Deficiency —	Bth. of 1 A.		Excess + or Deficiency —	Bth. of 2 A.		Excess + or Deficiency —	Bth. of 3 A.		Excess + or Deficiency —
Y.	Y.	Q	PER.	Y.	Q	PER.	Y.	Q	PER.	Y.	Q	PER	Y.	Q.	PER.	Y.	Q	PER
376	3	1	+ ½	6	2	+ ¾	9	3	+ 1¼	13		+ 1½	25	3		38	2	— 1¼
378	3	1	+ ½	6	2	+ 1¼	9	3	+ 1¾	13		+ ¼	25	2	+ 1¼	38	2	+ 1
380	3	1	+ ¾	6	2	+ 1¾	9	2	— ½	12	3		25	2	+ ½	38	1	+ ½
382	3	1	+ 1	6	2	+ 1½	9	2		12	3	+ 1	25	2	+ 1½	38		
384	3	1	+ 1¼	6	1	— ½	9	2	— ½	12	2	— 1¼	25	1	+ ½	38		+ 2¼
386	3	1	+ 1½	6	1	— ¼	9	2	+ 1¼	12	2	— ½	25		— 1	37	3	+ 1¾
388	3	1	+ 1¾	6	1	+ ¼	9	2	+ 2	12	2	+ ½	25		+ ½	37	2	+ 1
390	3	1	+ 2	6	1	+ ½	9	1	— ½	12	2	+ 1¼	25		+ 2¼	37	1	+ ¼
392	3		— 1	6	1	+ 1	9	1		12	1	— 1	24	3	+ ¾	37		— ½
394	3		— 1	6	1	+ 1½	9	1	+ ½	12	1	— ½	24	2	— ¾	37		+ 2
396	3		— ¾	6	1	+ 1¾	9	1	+ 1	12	1	+ ½	24	2	+ ½	36	3	+ 1
398	3		— ½	6	1	+ 2¼	9	1	+ 1½	12	1	+ 1	24	2	+ 2	36	2	— ¼

Length.	Bth. of 4 A.	Exceſs + or Deficiency —	Bth. of 5 A.	Exceſs + or Deficiency —	Bth of 6 A.	Exceſs + or Deficiency —	Bth. of 7 A.	Exceſs + or Deficiency —	Bth. of 8 A.	Exceſs + or Deficiency —	Bth. of 9 A.	Exceſs + or Deficiency —	Bth. of 10 A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
376	51 2		64 2	+1¾	77 1	+ ¼	90	—1¼	103	+ ¼	116	+1¾	128 3	
378	51 1	+ ¼	64	— ¼	77	+2	89 3	+1½	102 2	+ ¾	115 1		128	+ ½
380	51	+ ½	63 3	+ ¾	76 2	+1	89 1	+1	102	+1¼	114 3	+1½	127 2	+1¾
382	50 3	+1	63 2	+2	76	— ¼	88 3	+ ¾	101 2	+1¾	114	— ½	126 3	+ ½
384	50 2	+1	63	— ¼	75 3	+1½	88 1	+ ¼	101	+2¼	113 2	+ ¾	126	— ½
386	50 1	+1¼	62 3	+ ¾	75 1	+ ½	87 3	— ¼	100	+2¼	113	+2	125 2	+1¼
388	50	+1¼	62 2	+1¾	75	+2	87 2	+2¼	100	+2¼	112 1	— ¼	124 3	
390	49 2	—2	62	— ½	74 2	+ ½	87	+1¾	99 1	— ½	111 3	+ ¾	124	—1¼
392	49 2	+1½	61 3	+ ¼	74	—1	86 2	+1	98 3	— ¼	111 1	+1½	123 2	+ ½
394	49 1	+1½	61 2	+1	73 3	+ ½	86	+ ¼	98 1	— ¼	110 2	— ¾	123	+2
396	49	+1½	61	—1½	73 2	+2¼	85 2	— ½	97 3	— ¼	110		122 1	+ ¼
398	48 3	+1	61	+2	73	— ¼	85 1	+ ¾	97 2	+1¾	109 2	— ½	121 3	+ ½

Length.	Bth. of 1 R.	Exceſs + or Deficiency —	Bth. of 2 R.	Exceſs + or Deficiency —	Bth. of 3 R.	Exceſs + or Deficiency —	Bth. of 1 A.	Exceſs + or Deficiency —	Bth. of 2 A.	Exceſs + or Deficiency —	Bth. of 3 A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
400	3	— ¼	6	— ¾	9	—1	12	—1¼	24 1	+2	36 1	— ¾
402	3	— ¼	6	— ¼	9	— ½	12	— ½	24	—1	36 1	+1¾
404	3		6	+ ¼	9	+ ¼	12	+ ¼	24	+ ½	36	+ ¾
406	3	+ ¼	6	+ ½	9	+ ¾	12	+1	24	+2	35 3	— ¼
408	3	+ ½	6	+1	9	+1¼	12	+1¾	23 3	+ ½	35 2	—1¼
410	3	+ ½	6	+1¼	9	+2	12	+2¾	23 3	+2	35 2	+1¼
412	3	+ ¾	6	+1¾	9	+2½	11 3		23 2		35 1	
414	3	+1	6	+2	8 3	— ¼	11 3	+1	23 2	+1¾	35	—1
416	3	+1¼	6	+2½	8 3	+ ¼	11 3	+1½	23 2	— ¼	35	+1¼
418	3	+1½	6	+2¾	8 3	+1	11 2	—1	23 1	+1½	34 3	+ ¼
420	3	+1¾	5 3	— ¼	8 3	+1½	11 2	— ¼	23	— ½	34 2	—1
422	3	+1¾	5 3	+ ¼	8 2	—1½	11 2	+ ½	23	+ ¾	34 2	+1¼

Length.	Bth. of 4 A.		Exceſs + or Deficiency −	Bth. of 5 A.		Exceſs + or Deficiency −	Bth. of 6 A.		Exceſs + or Deficiency −	Bth. of 7 A.		Exceſs + or Deficiency −	Bth. of 8 A.		Exceſs + or Deficiency −	Bth. of 9 A.		Exceſs + or Deficiency −	Bth. of 10 A.		Exceſs + or Deficiency −
Y.	Y.	Q.	PER.	Y.	Q.	PER.	Y	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.
400	48	2	+1¼	60	2		72	3	+2	84	3	+ ¾	96	3	− ¾	109	2	+ ¾	121		
402	48	1	+1¼	60	1	+ ¾	72	1	+ ¼	84	1	− ½	96	1	−1	108	2	+1¾	120	2	+1¼
404	48		+1	60		+1¼	72		+1½	84		+1¾	96		+2¼	108		+2½	120		+2¾
406	47	3	+ ¾	59	3	+1¾	71	2	− ½	83	2	+ ¾	95	2	+1½	107	1	− ¾	119	1	+ ½
408	47	2	+ ¾	59	2	+2½	71	1	+1	83		− ½	95		+1¼	106	3	− ¼	118	3	+1¾
410	47	1	+ ½	59		− ¼	71		+2¼	82	3	+1½	94	2	+ ¾	106	1	+ ¼	118		− ¾
412	47		+ ¼	58	3	+ ¼	70	2	+ ¼	82	1	+ ¼	94		+ ¼	105	3	+ ¼	117	2	+ ¼
414	46	3	− ¼	58	2	+ ½	70	1	+1½	82		+2¼	93	2	− ½	105	1	+ ½	117		+1¼
416	46	2	− ½	58	1	+1	69	3	− ¾	81	2	+ ¾	93		−1	104	3	+ ½	116	2	+2
418	46	2	+2½	58		+1½	69	2	+ ¼	81		− ¾	92	3	+1¾	104	1	+ ½	115	3	− ½
420	46		−1¼	57	3	+1¾	69	1	+1½	80	3	+1	92	1	+ ¾	103	3	+ ½	115	1	− ¼
422	46		+1¾	57	2	+2	69		+2¼	80	1	− ½	91	3		103	1	− ½	114	2	+ ¾

Length.	Bth. of 1 R.	Exceſs + or Deficiency –	Bth. of 2 R.	Exceſs + or Deficiency –	Bth. of 3 R.	Exceſs + or Deficiency –	Bth. of 1 A.	Exceſs + or Deficiency –	Bth. of 2 A.	Exceſs + or Deficiency –	Bth. of 3 A.	Exceſs + or Deficiency –
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
424	3	+2	5 3	+2	8 2	– ¾	11 2	+1¼	23	+2¼	34 1	
426	3	+2¼	5 3	+1	8 2	– ¼	11 2	+2	22 3	+ ½	34	–1
428	2 3	–1	5 3	+1½	8 2	+ ¼	11 1	– ¾	22 3	+1¾	34	+1
430	2 3	– ¾	5 2	–1½	8 2	–1½	11 1	+ ½	22 2	+1¼	33 3	+1¾
432	2 3	– ¾	5 2	–1½	8 2	+1½	11 1	+ ½	22 2	+1¼	33 3	+2
434	2 3	– ½	5 2	–1	8 2	+2	11 1	+1½	22 2	+2¾	33 2	+ ¾
436	2 3	– ¼	5 2	– ¾	8 2	+2½	11 1	+2	22 1	+ ¾	33 1	– ¾
438	2 3	– ¼	5 2	–1	8 1	– ½	11	– ¾	22	–1½	33 1	+1½
440	2 3		5 2		8 1		11		22		33	
442	2 3	+ ¼	5 2	+ ¼	8 1	+ ½	11	+ ¾	22	+1½	33	+2¼
444	2 3	+ ½	5 2	+ ¾	8 1	+1	11	+1½	22	+3	32 3	+ ¾
446	2 3	+ ½	5 2	+1¼	8 1	+1¾	11	+2¼	21 3	+ ¾	32 2	– ¾

Length.	Bth. of 4 A.		Exceſs + or Deficiency —	Bth. of 5 A.		Exceſs + or Deficiency —	Bth. of 6 A.		Exceſs + or Deficiency —	Bth. of 7 A.		Exceſs + or Deficiency —	Bth. of 8 A.		Exceſs + or Deficiency —	Bth. of 9 A.		Exceſs + or Deficiency —	Bth. of 10 A.		Exceſs + or Deficiency —
Y.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.
424	45	3	+1¼	57		—1	68	2	+ ¼	80		+1½	91	2	+2½	102	3	+ ¼	114	1	+1½
426	45	2	+ ¾	57		+2¾	68	1	+1	79	2	+ ½	91		+1½	102	1		113	3	+2
428	45	1	+ ¼	56	2	— ½	67	3	—1½	79	1	+1½	90	2	+ ½	101	3	— ¼	113		—1
430	45		+2½	56		— ¼	67	1	+ ¼	78	2	+ ¾	89	3	+1½	101		+2	112		— ¾
432	45		+2¾	56		— ¼	67	1	+ ½	78	2	+1	89	3	+1¾	101		+2½	112		— ½
434	44	3	+2	55	3	— ¼	67		+1¼	78		—1	89	1	+ ¼	100	2	+1¾	111	2	— ¼
436	44	2	—1½	55	2		66	3	+2¼	77	3	+ ¾	89		+2¾	100		+1¼	111		
438	44	1	+ ¾	55	1		66	1	— ¾	77	2	+2¼	88	2	+1½	99	2	+ ¾	110	2	
440	44			55			66			77			88			99			110		
442	44		+3	54	3		65	3	+ ¾	76	3	+1½	87	2	—1½	98	2	— ¾	109	2	
444	43	2	—1½	54	2		65	2	—1½	76	1	— ¾	87	1	— ¾	98		—1½	109.		
446	43	2	+1½	54	1		65	1	+2	76		+ ½	87		+3	97	3	+1¼	108	2	— ¼

Length.	Bth. of 1 R.		Exceſs + or Deficiency −	Bth. of 2 R.		Exceſs + or Deficiency −	Bth. of 3 R.		Exceſs + or Deficiency −	Bth. of 1 A.		Exceſs + or Deficiency −	Bth. of 2 A.		Exceſs + or Deficiency −	Bth. of 3 A.		Exceſs + or Deficiency −
Y.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.
448	2	3	— ¾	5	2	+ 1½	8	1	+ 2½	11		+ 3	21	2	— 1½	32	2	+ 1½
450	2	3	+ 1	5	2	+ 1¾	8		— 1	10	3		21	2	— ½	32	1	+ ¼
452	2	3	+ ½	5	2	+ 1¼	8		— ½	10	3	+ ½	21	2	+ 1½	32	1	+ 1¾
454	2	3	+ 1¼	5	2	+ 2½	8			10	3	+ 1¼	21	2	+ 2½	32		+ ¼
456	2	3	+ 1½	5	1	— ¾	8		+ ¾	10	3	+ 2	21	1	+ ¼	32		+ 2½
458	2	3	+ 1¾	5	1	— ½	8		+ 1	10	2	— 1	21	1	+ 1¾	31	3	+ ¾
460	2	3	+ 1¾	5	1	— ¼	8		+ 1¾	10	2	— ¼	21		— ½	31	2	— 1
462	2	2	— 1¾	5	1	+ ½	8		+ 2½	10	2	— ½	21		+ ½	31	2	+ 1
464	2	2	— 1¾	5	1	+ ½	8		+ 2¾	10	2	+ 1	21		+ 2¼	31	1	— ½
466	2	2	— 1½	5	1	+ 1	8		+ 3¼	10	2	+ 1¾	20	3	— ¾	31	1	+ 1¼
468	2	2	— 1¼	5	1	+ 1¼	7	3		10	2	+ 2½	20	3	+ 1	31		— ½
470	2	2	— 1	5	1	+ 1½	7	3	+ ½	10	1	— ½	20	2	— 1½	31		+ 1½

Length.	Bth. of 4 A.	Exceſs + or Deficiency —	Bth. of 5 A.	Exceſs + or Deficiency —	Bth. of 6 A.	Exceſs + or Deficiency —	Bth. of 7 A.	Exceſs + or Deficiency —	Bth. of 8 A.	Exceſs + or Deficiency —	Bth. of 9 A.	Exceſs + or Deficiency —	Bth. of 10 A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
448	43 1	+ ½	54	— ¼	65	+2¾	75 3	+1¾	86 2	+1	97 1	+ ¼	108	— ½
450	43	— ¼	53 3	— ¼	64 2	— ½	75		86	— ½	96 3	— ¾	107 2	— ¾
452	43	+3	53 2	— ½	64 1		75	+ ½	85 2	—2½	96 2	+2	107	—1¼
454	42 3	+1¾	53 1	— ¾	64		74 3	+2	85 1	— ½	96 3	+2	106 3	+2
456	42 2	+ ¾	53	—1	63 3	—1	74 1	— ¾	85	+1¼	95 2	— ½	106 1	+1¾
458	42 1	— ¼	53	+2½	63 2	+1¼	74	— ¾	84 2	— ½	95	—1½	105 3	+1
460	42	—1¼	52 3	+2¼	63 1	+1¾	73 3	+1½	84 1	+1¼	94 3	+1	105 1	+ ½
462	42	+1½	52 1	— ½	63	+2¼	73 1	—1¼	84	+3	94 1	— ½	104 3	— ¼
464	41 3	+ ¼	52 1	+1½	62 2	—1¼	73	— ¼	83 2	+ ¾	94	+1¾	104 2	+3
466	41 2	+3	52	+1	62 1	—1	72 3	+ ¾	83	—1¼	93 2	+ ½	104	+2
468	41 2	+2	51 3	+ ½	62	— ¾	72 2	+1½	82 3	+ ¼	93	—1	103 2	+1¼
470	41 1	+1	51 2	+ ¼	61 3	— ½	72	—1¼	82 2	+1¾	92 3	+1	103	+ ½

Length.	Bth. of 1 R.	Excess + or Deficiency −	Bth. of 2 R.	Excess + or Deficiency −	Bth. of 3 R.	Excess + or Deficiency −	Bth. of 1 A.	Excess + or Deficiency −	Bth. of 2 A.	Excess + or Deficiency −	Bth. of 3 A.	Excess + or Deficiency −
Ys	Y. Q.	PER.	Y. Q	PER.	Y. Q.	PER.	Y. Q	PER	Y. Q.	PER.	Y. Q	PER
472	2 2	−1	5 1	+2	7 3	+1	10 1		20 2		30 3	− ¼
474	2 2	− ¾	5 1	+2¼	7 3	+1½	10 1	+ ½	20 2	+1¼	30 3	+1¾
476	2 2	− ½	5	−1¼	7 3	+1¾	10 1	+1¼	20 2	+2½	30 2	
478	2 2	− ½	5	− ¾	7 2	−1½	10 1	+2	20 1		30 2	+2
480	2 2	− ¼	5	− ½	7 2	−1	10	−1¼	20 1	+1½	30 1	+ ¼
482	2 2	− ¼	5	− ¼	7 2	− ½	10	− ½	20 1	−1¼	30 1	+1¾
484	2 2		5		7 2		10		20		30	
486	2 2	+ ¼	5	+1¼	7 2	+ ½	10	+ ½	20	+1¼	30	+1¾
488	2 2	+ ¼	5	+ ½	7 2	+1	10	+1½	20	+1¼	29 3	
490	2 2	+ ½	5	+1	7 2	+1½	10	+2	19 3		29 3	+2
492	2 2	+ ¾	5	+1¼	7 2	+2	10	+2½	19 3	+1¼	29 2	+ ¼
494	2 2	+ ¾	5	+1¾	7 2	+1½	10	+3½	19 2	+1½	29 2	+1¾

Length.	Bth. of 4 A.	Excess + or Deficiency −	Bth. of 5 A.	Excess + or Deficiency −	Bth. of 6 A.	Excess + or Deficiency −	Bth. of 7 A.	Excess + or Deficiency −	Bth. of 8 A.	Excess + or Deficiency −	Bth. of 9 A.	Excess + or Deficiency −	Bth. of 10 A.	Excess + or Deficiency −
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
472	41	+ ¼	51 1	− ¼	61 2	− ¼	71 3	− ½	82	− ½	92 1	− ½	102 2	− ½
474	41	+2½	51	− ¾	61 1	− ¼	71 2	+ ½	81 3	+1	92	+1½	102	−1¾
476	40 3	+1¼	51	+2½	61		71 1	+1¼	81 2	+2½	91 2	− ¼	101 3	+1
478	40 2		50 3	+1¾	60 3		71	+1¾	81		91 1	+1¾	101 1	− ¾
480	40 2	+2¾	50 2	+1½	60 2	− ¼	70 2	−1	80 3	+1½	90 3	+ ½	101	+3¼
482	40 1	+1½	50 1	+ ¾	60 1		70 1	− ½	80 2	+2¾	90 2	+2	100 2	+1½
484	40		50		60		70		80		90		100	
486	40	+2½	50	+3¼	59 3		69 3	+ ½	79 3	+1¼	89 3	+2	99 2	−1½
488	39 3	+1¼	49 3	+2½	59 2		69 2	+1¼	79 2	+2½	89 1	− ¼	99 1	+1
490	39 2	+1	49 2	+1¾	59 1	− ¼	69 1	+1¾	79	− ¼	89	+1¾	98 3	− ½
492	39 2	+2½	49 1	+1¼	59	− ½	69	+1¼	78 3	+ ¾	88 2	− ½	98 2	+2
494	39 1	+1	49	− ¼	58 3	− ½	68 2	+1¼	78 2	+2	88 1	−1¼	98	+ ½

Length.	Bth. of 1 R.	Excess + or Deficiency −	Bth. of 2 R.	Excess + or Deficiency −	Bth. of 3 R.	Excess + or Deficiency −	Bth. of 1 A.	Excess + or Deficiency −	Bth. of 2 A.	Excess + or Deficiency −	Bth. of 3 A.	Excess + or Deficiency −
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q	PER.	Y. Q.	PER.
496	2 2	+1	5	+2	7 2	+3	9 3		19 2	− ¼	29 1	
498	2 2	+1¼	5	+1¼	7 1	− ½	9 3	+ ½	19 2	+1	29 1	+1¾
500	2 2	+1¼	5	+2¾	7 1	− ¼	9 3	+1¼	19 2	+2¼	29	− ¾
502	2 2	+1½	5	+3	7 1	+ ¼	9 3	+1¾	19 1	− ½	29	+1¼
504	2 2	+1¾	4 3	− ¾	7 1	+ ¾	9 2	−1¾	19 1	+ ¾	28 3	− ¾
506	2 2	+1¾	4 3	− ½	7 1	+1¼	9 2	−1	19 1	+2	28 3	+1
508	2 2	+2	4 3	− ¼	7 1	+1¾	9 2	− ½	19		28 2	−1¼
510	2 2	+2¼	4 3		7	−1¾	9 2	+ ¼	19	+ ¼	28 2	+ ½
512	2 2	+2½	4 3	+2	7	−1¼	9 2	+ ¾	19	+1¾	28 2	+2¾
514	2 1	−1¼	4 3	+ ¼	7	−1	9 2	−1½	19	−1¼	28 1	
516	2 1	−1½	4 3	+1	7	− ½	9 2	+2	18 3	− ¼	28 1	+1¾
518	2 1	−1½	4 3	+1¼	7	+1½	9 1	−1½	18 3	+1	28	− ½

Length.	Bth. of 4 A.	Exceſs + or Deficiency −	Bth. of 5 A.	Exceſs + or Deficiency −	Bth. of 6 A.	Exceſs + or Deficiency −	Bth of 7 A.	Exceſs + or Deficiency −	Bth. of 8 A.	Exceſs + or Deficiency −	Bth. of 9 A.	Exceſs + or Deficiency −	Bth. of 10 A.	Exceſs + or Deficiency −
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
496	39	− ½	48 3	− ¾	58 2	− ¾	68 1	− ¾	78	−1	88	+3	97 2	−1¼
498	39	+2¼	48 2	−1½	58 2	+3	68	− ½	77 3		87 2	+ ½	97 1	+1
500	38 3	+ ½	48 2	+1¾	58	−1¼	67 3	− ¼	77 2	+1	87 1	+2¼	97	+3¼
502	38 2	−1	48 1	+ ¾	58	+2½	67 2	+ ¼	77 1	+2	86 3	− ¼	96 2	+1½
504	38 2	+1½	48	− ¼	57 2	−1¾	67 1	+ ½	76 3	−1¼	86 2	+1¼	96	− ½
506	38 1	− ¼	47 3	−1¼	57 2	+1¾	67	+ ¾	76 2	− ¼	86	−1¼	95 3	+1¼
508	38	−1¾	47 3	+2	57 1	+1½	66 3	+1	76 1	+ ½	85 3		95 2	
510	38	+ ¾	47 2	+ ¾	57	+1	66 2	+1¼	76	+1¼	85 2	+1½	95	+1¾
512	38	+3½	47 1		56 3	+1	66 1	+1¾	75 2	−1½	85	− ½	94 2	+ ¼
514	37 3	+1½	47	−1¼	56 2		66	+1½	75 1	−1¼	84 3		94 1	+1½
516	37 2	− ¼	47	+1¾	56 1	− ½	65 3	+1½	75	− ¾	84 2	+1½	93 3	+ ¾
518	37 2	+1¼	46 3	+ ½	56	+1¼	65 2	+1¾	74 3		84	−1½	93 2	+1

Length.	Bth. of 1 R.		Exceſs + or Deficiency −	Bth. of 2 R.		Exceſs + or Deficiency −	Bth. of 3 R.		Exceſs + or Deficiency −	Bth. of 1 A.		Exceſs + or Deficiency −	Bth. of 2 A.		Exceſs + or Deficiency −	Bth. of 3 A.		Exceſs + or Deficiency −
Y.	Y.	Q.	PER.	Y.	Q.	PER	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.
520	2	1	−1¼	4	3	+1¾	7		+¼	9	1	−1	18	3	+1½	28		+1½
522	2	1	−1	4	3	+2	7		+¾	9	1	−½	18	2	−¾	28		+3¼
524	2	1	−1	4	3	+2½	7		+1¼	9	1	+¼	18	2	+½	27	3	+¾
526	2	1	−¾	4	2	−¾	7		+1¾	9	1	+1	18	2	+1¾	27	2	−1¾
528	2	1	−¾	4	2	−1½	7		+2½	9	1	+1½	18	1	−1½	27	2	+¼
530	2	1	−½	4	2	−1¼	7		+2¾	9	1	+2	18	1	−½	27	2	+1½
532	2	1	−½	4	2	−¾	7		+3¼	9		−1½	18	1	+1	27	1	−½
534	2	1	−¼	4	2	−½	6	3	−¾	9		−1	18	1	+2¼	27	1	+1
536	2	1	−¼	4	2	−¼	6	3	−½	9		−½	18		−1¼	27		−1½
538	2	1		4	2		6	3		9			18		+¼	27		+¼
540	2	1	+¼	4	2	+¼	6	3	+½	9		+¾	18		+1¼	27		+2
542	2	1	+½	4	2	+¾	6	3	−¾	9		+1¼	18		+2½	27	3	−¾

from england

Length.	Bth. of 4 A.	Excess + or Deficiency −	Bth. of 5 A.	Excess + or Deficiency −	Bth. of 6 A.	Excess + or Deficiency −	Bth. of 7 A.	Excess + or Deficiency −	Bth. of 8 A.	Excess + or Deficiency −	Bth. of 9 A.	Excess + or Deficiency −	Bth. of 10 A.	Excess + or Deficiency −
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q	PER.
520	37 1	+ ¼	46 2	— ¾	56	+2¾	65 1	+1¼	74 2	+ ¾	83 3	— ½	93	—1¼
522	37	—1¼	46 2	+2½	55 3	+2	65	+1¾	74 1	+1¼	83 2	+1	92 3	+ ½
524	37	+1	46 1	+1¼	55 2	+1¼	64 3	+1¾	74	+2	83 1	+2	92 1	—2
526	37	+3½	46		55 1	+ ¾	64 2	+1½	73 2	—2	82 3	—1	92	— ¼
528	36 3	+1½	45 3	—1¼	55		64 1	+1½	73 1	—1¼	82 2	+ ¼	91 3	+1¾
530	36 2	—1	45 3	+1	54 3	—1½	64	+ ½	73	—2	82 1		91 2	+1¾
532	36 2	+1¼	45 2	+ ½	54 2	—1	63 3	+1¾	72 3		82	+2¾	91	+1¼
534	36		45 1	—1¼	54 2	+2	63 2	+1	72 2	— ¼	81 2	—1¼	90 3	+2
536	36 1	+2¼	45 1	+1½	54 1	+1	63 1	+ ½	72 1		81 1	— ½	90 1	—1
538	36	+ ¼	45	+ ¼	54	+ ½	63	+ ½	72	+ ½	81	+ ½	90	+ ¾
540	36	+2¾	44 3	—1	53 3	— ½	62 3		71 3	+1	80 3	+1½	89 2	—2¼
542	35 3	+ ½	44 3	+1¾	53 2	—1¼	62 2	—1½	71 2	+1	80 2	+2¼	89 1	— ¾

Length.	Bth. of 1 R.	Excess + or Deficiency −	Bth. of 2 R.	Excess + or Deficiency −	Bth. of 3 R.	Excess + or Deficiency −	Bth. of 1 A.	Excess + or Deficiency −	Bth. of 2 A.	Excess + or Deficiency −	Bth. of 3 A.	Excess + or Deficiency −
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
544	2 1	+ ½	4 2	+ ¼	6 3	+1½	8 3	−1¾	17 3	+ ¾	26 2	−1¼
546	2 1	+ ¾	4 2	+1¼	6 3	+2	8 3	−1¾	17 3	+ ½	26 2	−1¼
548	2 1	+ ¾	4 2	+1½	6 3	+2¼	8 3	−1½	17 3	+1½	26 2	
550	2 1	+1	4 2	+1¾	6 2	−1¾	8 3	−1	17 2	−1¾	26 2	+1¾
552	2 1	+1¾	4 2	+2¼	6 2	−1¼	8 3	− ¼	17 2	− ½	26 1	− ¾
554	2 1	+1¼	4 2	+2	6 2	−1	8 3	+ ½	17 2	+ ½	26 1	+ ¾
556	2 1	+1¼	4 2	+2¾	6 2	− ½	8 3	+ ¾	17 2	+1¾	26	−2
558	2 1	+1½	4 1	−1½	6 2		8 3	+1½	17 1	−1¼	26	− ½
560	2 1	+1¾	4 1	−1¼	6 2	+ ¼	8 3	+2	17 1	− ½	26	+1¼
562	2 1	+1¾	4 1	−1	6 2	+ ¾	8 2	−2	17 1	+ ½	25 3	−1½
564	2 1	+2	4 1	− ¾	6 2	+1¼	8 2	−1½	17 1	+1¾	25 3	
566	2 1	+2	4 1	−2	6 2	+1¾	8 2	−1	17	−2	25 3	+1¾

Length.	Bth. of 4 A.	Exceſs + or Deficiency −	Bth. of 5 A.	Exceſs + or Deficiency −	Bth. of 6 A.	Exceſs + or Deficiency −	Bth. of 7 A.	Exceſs + or Deficiency −	Bth. of 8 A.	Exceſs + or Deficiency −	Bth. of 9 A.	Exceſs + or Deficiency −	Bth. of 10 A.	Exceſs + or Deficiency −
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	FER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
544	35 2	−1½	44 2	+ ¼	53 2	+2	62 1	− ½	71 1	+1¼	80	−1½	89	+1¾
546	35 2	+1¼	44 1	− ½	53 1	+2	62		70 3	−1¾	79 3	+ ¾	88 2	−1¼
548	35 1	−1½	44 1	+1¾	53		61 3	−1¼	70 3	+1¾	79 2	+ ¼	88 1	−1¼
550	35 1	+1	44		52 3	−1	61 2	−1¾	70 2	+1¾	79 1	+1	88	
552	35	−1¼	43 3	−1¾	52 2	−1¾	61 2	−2¼	70 1	+2	79	+1¾	87 3	+1¼
554	35	+1	43 3	+1¼	52 2	+1½	61 1	+1¾	70	+2	78 2	−2¼	87 2	+2½
556	34 3	−1¼	43 2	− ½	52 1	+ ½	61	+1¼	69 3	−2	78 1	−1¾	87	−1
558	34 3	−1	43 2	+2½	52	− ¾	60 3	+ ½	69 2	+2	78	−1	86 3	+ ¼
560	34 2	−1¼	43 1	+ ½	51 3	−1¾	60 2		69 1	+2	77 3	− ½	86 2	+1¼
562	34 2	+1	43	−1	51 3	+1½	60 1	− ½	69	+2	77 2		86 1	+2¼
564	34 1	−1¼	43	+1¾	51 2	+ ¼	60	−1¼	68 3	+1¾	77 2	− ½	85 3	−1
566	34 1	+ ¾	42 3		51 1	−1	59 3	−1½	68 2	+1¾	77	+ ¾	85 2	− ¼

Length.	Bth. of 1 R.		Excess + or Deficiency −	Bth. of 2 R.		Excess + or Deficiency −	Bth. of 3 R.		Excess + or Deficiency −	Bth. of 1 A.		Excess + or Deficiency −	Bth. of 2 A.		Excess + or Deficiency −	Bth. of 3 A.		Excess + or Deficiency −
Y.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.	Y.	Q.	PER.
568	2	1	+2¼	4	1	− ¼	6	2	+2	8	2	− ½	17		− ¾	25	2	−1¼
570	2	1	+2½	4	1		6	2	+2½	8	2		17		+ ¼	25	2	+ ½
572	2	1	+2½	4	1	+ ½	6	1	−1¾	8	2	+ ¾	17		+1½	25	2	+2¼
574	2		−2	4	1	+ ½	6	1	−1¼	8	2	+1¼	17		+2¼	25	1	−1
576	2		−2	4	1	+1	6	1	−1	8	2	+2	16	3	−1	25	1	+ ¾
578	2		−1¾	4	1	+1	6	1	− ½	8	2	+2½	16	3		25	1	+2¼
580	2		−1½	4	1	+1½	6	1	− ¼	8	1	−1¾	16	3	+1¼	25		− ½
582	2		−1½	4	1	+1¾	6	1	− ¼	8	1	−1¼	16	3	+2¼	25		+1
584	2		−1¼	4	1	+2¼	6	1	+ ¾	8	1	− ¾	16	2	−1¼	24	3	−2¼
586	2		−1¼	4	1	+2¼	6	1	+1¼	8	1	− ¼	16	2	− ¼	24	3	− ½
588	2		−1	4		−2¼	6	1	+1½	8	1	+ ½	16	2	+ ¾	24	3	+1¼
590	2		− ¾	4		−2	6	1	+2	8	1	+1	16	2	+2	24	2	−2

Length.	Bth. of 4 A.	Exceſs + or Deficiency —	Bth. of 5 A.	Exceſs + or Deficiency —	Bth. of 6 A.	Exceſs + or Deficiency —	Bth. of 7 A.	Exceſs + or Deficiency —	Bth. of 8 A.	Exceſs + or Deficiency —	Bth. of 9 A.	Exceſs + or Deficiency —	Bth. of 10A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q	PER.	Y. Q.	PER.
568	34	—1½	42 2	—1¾	51 1	+1¼	59 3	+2	68 1	+1½	76 3	+1¼	85 1	+ ¾
570	34	+ ¾	42 2	+ ¾	51	+1	59 2	+1¼	68	+1¼	76 2	+1½	85	+1¾
572	34	+3	42 1	—1	50 3	— ¼	59 1	+ ½	67 3	+1¼	76 1	+2	84 2	—2
574	33 3	+ ½	42 1	+1¾	50 2	+1½	59	— ½	67 2	+ ¾	76	+2	84 1	—1¼
576	33 2	—2	42	— ¼	50 2	+1½	58 3	—1¼	67 1	— ½	75 2	—2¼	84	— ½
578	33 2		42	+2½	50 1		58 2	—2	67	+ ¼	75 1	—2	83 3	+ ¼
580	33 2	+2¼	41 3	+ ½	50	—1	58 2	+1¾	66 3		75	—2	83 2	+1
582	32 1	— ¼	41 2	—1½	50	+2	58 1	+ ¾	66 2	— ½	74 3	—1¾	83 1	+1¾
584	33 1	+2	41 2	+1¼	49 3	+ ½	58	— ¼	66 1	—1	74 2	—1½	83	+2½
586	33	— ¾	41 1	—1	49 2	—1	57 3	—1	66	—1¼	74 1	—1½	82 2	— ¾
588	33	+1½	41 1	+2	49 2	+2	57 2	—2¼	66	+3	74	+ ½	82 1	—1
590	33	+3¾	41	— ¼	49 1	— ½	57 2	—1½	65 2	—2¼	73 3	—1½	82	— ½

Length.	Bth. of 1 R.	Exceſs + or Deficiency —	Bth. of 2 R.	Exceſs + or Deficiency —	Bth. of 3 R.	Exceſs + or Deficiency —	Bth. of 1 A.	Exceſs + or Deficiency —	Bth. of 2. A.	Exceſs + or Deficiency —	Bth. of 3 A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.
592	2	— ¾	4	—1	6 1	+2¼	8 1	+1½	16 2	+3	24 2	— ¼
594	2	— ½	4	—1½	6	—2	8 1	+2	16 1	— ¾	24 2	+1¼
596	2	— ½	4	—1¼	6	+1¾	8 1	+2½	16 1		24 1	+2
598	2	— ½	4	— ¾	6	—1¼	8	—2	16 1	+1¼	24 1	— ½
600	2	— ¼	4	— ½	6	—1	8	—1¼	16 1	+2¼	24 1	+1

Length.	Bth. of 4 A.	Exceſs + or Deficiency —	Bth. of 5 A.	Exceſs + or Deficiency —	Bth. of 6 A.	Exceſs + or Deficiency —	Bth. of 7 A.	Exceſs + or Deficiency —	Bth. of 8 A.	Exceſs + or Deficiency —	Bth. of 9 A.	Exceſs + or Deficiency —	Bth. of 10 A.	Exceſs + or Deficiency —
Y.	Y. Q.	PER.	Y. Q.	PER.	Y. Q	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q.	PER.	Y. Q	PER.
592	32 3	+1	41	+2¼	49	—1	57 1	+ ¼	65 2	+2	73 2	—1½	81 3	
594	32 2	—1¾	40 3		49	+2	57	— ¾	65 1	+1¼	73 1	—1½	81 2	+ ½
596	32 2	+ ¼	40 2	—2	48 3	+ ½	57	+3¼	65	+ ¾	73	—1½	81 1	+ ¾
598	32 2	+2½	40 2	— ½	48 2	—1¼	56 3	+2	64 3		73	+3	81	+1¼
600	32 1	— ¼	40 1	—1½	48 2	+2	56 2	+ ½	64 2	— ¾	73 2	—2	80 3	+1¾

THE

GENTLEMAN AND FARMER'S

Pocket Aſſiſtant.

TABLE SECOND.

Length.	*Brdth.* *of* 10 *A.*	*Brdth.* *of* 15 *A.*	*Brdth.* *of* 20 *A.*
Yards	*Yards*	*Yards*	*Yards*
220	220		
230	210		
240	201		
250	193		
260	186		
270	179	268	
280	173	260	
290	167	250	
300	161	242	
310	156	234	312
320	151	226	302
330	146	220	292

Length.	*Brdth.* *of* 10 *A.*	*Brdth.* *of* 15 *A.*	*Brdth.* *of* 20 *A.*	*Brdth.* *of* 25 *A.*	*Brdth.* *of* 30 *A.*	*Brdth.* *of* 35 *A.*	*Brdth.* *of* 40 *A.*
Yards	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*
340	142	214	285				
350	138	207	277	346			
360	134	202	269	336			
370	131	196	262	327			
380	127	191	254	318	382		
390	124	186	248	310	372		
400	121	181½	242	302½	363	425½	
410	118	177	236	295	354	413	
420	115	173	230½	288	345	403	
430	112	168	224	280	336	492	448
440	110	165	220	275	330	385	440
450	107½	161	215	269	323	376½	430

Length.	Brdth. of 10 *A.*	Brdth. of 15 *A.*	Brdth. of 20 *A.*	Brdth. of 25 *A.*	Brdth. of 30 *A.*	Brdth. of 35 *A.*	Brdth. of 40 *A.*	Brdth. of 45 *A.*	Brdth. of 50 *A.*	Brdth. of 55 *A.*
Yards	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*
460	105	158	210½	263	315½	368	421	473½		
470	102	154½	206	257½	309	360½	412	463½		
480	101	151¼	201½	252	302½	353	403	454		
490	99	148	197½	247	296	346	395	444½	494	
500	97	145	193	242	290½	339	387	435½	484	
510	95	142½	190	237	285	332	379½	427	474½	522
520	93	139½	186	233	279	326	372	419	465	512
530	91	137	183	228½	274	320	365½	411	457	502½
540	89½	134½	179	224	269	313½	358½	403	448	493
550	88	132	176	220	264	308	352	396	440	484
560	86½	129½	173	216	259	302½	346	389	432	475½
570	85	127	170	212	255	297	339½	382	424½	467

Length.	*Brdth. of 60 A.*	*Brdth. of 65 A.*
Yards	*Yards*	*Yards*
540	538	
550	528	
560	518½	562
570	509½	552

Length.	*Brdth.* *of* 10 *A.*	*Brdth.* *of* 15 *A.*	*Brdth.* *of* 20 *A.*	*Brdth.* *of* 25 *A.*	*Brdth.* *of* 30 *A.*	*Brdth.* *of* 35 *A.*	*Brdth.* *of* 40 *A.*	*Brdth.* *of* 45 *A.*	*Brdth.* *of* 50 *A.*	*Brdth.* *of* 55 *A.*
Yards	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*
580	83½	125	167	208½	250	292	334	375½	417	459
590	82	123	164	205	246	287	328	369	410	451
600	80½	121	161	201½	242	282	322½	363	403	443½
610	79½	119	158½	198	238	278	317½	357	397	436½
620	78	117	156	195	234	273	312	351	390	429½
630	77	115	153½	192	230½	269	307	346	384	422½
640	75½	113½	151	189	227	264½	302½	340	378	416
650	74½	111½	149	186	223½	260½	298	335	372	409½
660	73	110	146½	183	220	256½	293½	330	366½	403
670	72	108½	144½	180½	216½	253	289	325	361	397
680	71	107	142	178	213½	249	285	320	356	391½
690	70	105	140	175½	210½	245½	280½	315½	351	386

Length.	*Brdth.* *of* 60 *A.*	*Brdth.* *of* 65 *A.*	*Brdth.* *of* 70 *A.*	*Brdth.* *of* 75 *A.*	*Brdth.* *of* 80 *A.*	*Brdth.* *of* 85 *A.*	*Brdth.* *of* 90 *A.*	*Brdth.* *of* 95 *A.*
Yards	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*
580	500½	542½	584					
590	492	533	574					
600	484	524	564½	605				
610	476	516	555½	595				
620	468½	517½	546½	585½	624½			
630	461	499	538	576	614½			
640	454	491½	529½	567	605	643		
650	447	484	521	558½	595½	633		
660	440	476½	513	550	586½	623	660	
670	433½	469½	505½	542	578	614	650	
680	427	462½	498	534	569½	605	640½	676
690	421	456	491	526	561	696	631	666½

Length.	*Brdth.* *of* 10 *A.*	*Brdth.* *of* 15 *A.*	*Brdth.* *of* 20 *A.*	*Brdth.* *of* 25 *A.*	*Brdth.* *of* 30 *A.*	*Brdth.* *of* 35 *A.*	*Brdth.* *of* 40 *A.*	*Brdth.* *of* 45 *A.*	*Brdth.* *of* 50 *A.*	*Brdth.* *of* 55 *A.*
Yards	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*
700	69	104	138	173	207½	242	276½	311	346	380
710	68	102	136	170½	204½	238½	272½	306½	341	375
720	67	101	134½	168	201½	235	269	303	336	370
730	66	99½	132½	166	199	232	265	398	331½	364½
740	65½	98	131	163½	196	229	261½	394½	327	360
750	64½	97	129	161	193½	226	258	390	322½	355
760	64	95½	127½	159	191	223	255	286½	318½	350
770	63	94	126	157	188½	220	251½	283	314	346
780	62	93	124	155	186	217	258	279	310	341
790	61	92	122½	153	184	214½	255	275	306	337
800	60½	91	121	151	181½	212	242	272	302½	338
810	60	89½	119½	149	179	209	239	267	299	328½

Length.	*Brdth.* of 60 *A.*	*Brdth.* of 65 *A.*	*Brdth.* of 70 *A.*	*Brdth.* of 75 *A.*	*Brdth.* of 80 *A.*	*Brdth.* of 85 *A.*	*Brdth.* of 90 *A.*	*Brdth.* of 95 *A.*	*Brdth.* of 100 *A.*
Yards	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*
700	415	449½	484	518½	553	587½	622	657½	691½
710	409	443	477	511	545	579½	613½	647½	681½
720	403	437	470½	504	538	571½	605	638½	672
730	398	431	464	497	530½	563½	597	630	663
740	392½	425	458	490½	523	556	588½	621½	654
750	387	419	452	484	516	558½	581	613	645
760	382	414	446	478	509½	541	573	605	637
770	377	408½	440	471½	503	534	566	597	628½
780	372	403	434	465	496½	527½	558½	589½	620½
790	367½	398	429	459½	490	521	551	582	612½
800	363	393	423½	454	484	514	544½	575	605
810	358½	388½	418	448	478	508	538	567½	597½

Length.	Brdth. of 10 A.	Brdth. of 15 A.	Brdth. of 20 A.	Brdth. of 25 A.	Brdth. of 30 A.	Brdth. of 35 A.	Brdth. of 40 A.	Brdth. of 45 A.	Brdth. of 50 A.	Brdth. of 55 A.
Yards	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*
820	59	88½	118	147½	177	206½	236	265½	295	324½
830	58	87½	116½	146	175	204	233	262½	291½	321
840	57½	86½	115	144	173	201½	230½	259	288	317
850	57	85½	114	142	171	199	228	256	285	313
860	56	84½	112½	141	169	197	225	253	281½	309½
870	55½	83½	111	139	167	195	222½	250	278	306
880	55	82½	110	137½	165	192½	220	247½	275	302½
890	54	81½	109	136	163	190	217½	245	272	299
900	54	80½	107½	134½	161	188	215	242	269	296
910	53	80	106½	133	160	186½	213	240	266	293½
920	52½	79	105	131½	158	184	210½	237	263	289
930	52	78	104	130	156	182	208	234	260	286

Length.	Brdth. of 60 A.	Brdth. of 65 A.	Brdth. of 70 A.	Brdth. of 75 A.	Brdth. of 80 A.	Brdth. of 85 A.	Brdth. of 90 A.	Brdth. of 95 A.	Brdth. of 100 A.	Brdth. of 150 A.
Yards	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*
820	354	383½	413	442½	472	502	531	561	590	
830	350	379	408	437	466½	495½	525	554	583	
840	346	374½	403	432	461	490	518½	547	576	
850	341½	370	398½	427	455½	484	512½	541	569	854
860	337½	366	394	422	450	478	506½	534½	563	844
870	334	362	389½	417	445	473	501	528½	556	834½
880	330	357½	385	412½	440	467½	495	522½	550	825
890	326	353½	380½	408	435	462	489½	516½	544	815
900	322½	349½	376½	403	430	457	484	511	538	806½
910	319½	346	373	399½	426	453	479½	506	532	799
920	315½	342	368	394½	421	447	473½	500	526	789
930	312	338	364	390	416	442	468	494	520½	780½

Length.	*Brdth.* of 10 *A.*	*Brdth.* of 15 *A.*	*Brdth.* of 20 *A.*	*Brdth.* of 25 *A.*	*Brdth.* of 30 *A.*	*Brdth.* of 35 *A.*	*Brdth.* of 40 *A.*	*Brdth.* of 45 *A.*	*Brdth.* of 50 *A.*	*Brdth.* of 55 *A.*
Yards	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*
940	51½	77	103	129	154½	180	206	231½	257½	283
950	51	76½	102	127	153	178	203	229	255	280
960	50½	75½	101	126	151	176½	201½	227	252	277
970	50	75	100	125	149½	174½	199½	224½	249½	274½
980	49	74	98½	123	148	173	197½	222	247	271½
990	49	73	98	122	146½	171	195½	220	244½	269
1000	48½	72½	97	121	145	169½	193½	218	242	266
1100	44	66	88	110	132	154	176	198	220	242
1200	40	60½	80½	101	121	141	161	181½	201½	222
1300	37	56	74½	93	111½	130	149	167½	186	205
1400	34	51½	68½	86	103	120	137	154	171½	188½
1500	32	48	64½	80½	97	113	129	145	161	177½

Length.	*Brdth.* *of* 60 *A.*	*Brdth.* *of* 65 *A.*	*Brdth.* *of* 70 *A.*	*Brdth.* *of* 75 *A.*	*Brdth.* *of* 80 *A.*	*Brdth.* *of* 85 *A.*	*Brdth.* *of* 90 *A.*	*Brdth.* *of* 95 *A.*	*Brdth.* *of* 100 *A.*	*Brdth.* *of* 150 *A.*
Yards	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*
940	309	334½	360½	386	412	437½	463	489	515	772
950	305½	331	356½	382	407½	433	458½	484	509½	764
960	302½	328	353	378	403	428½	454	479	504	756
970	299	324	349	374	399	424	449	474	499	748½
980	296	321	345½	370½	395	420	444½	469	494	741
990	293	318	342	366½	391	415½	440	464½	489	733
1000	290½	314½	339	363	387	411½	435½	460	484	726
1100	264	286	308	330	352	374	396	418	440	660
1200	242	262	283	303	323½	344	364	384	404	605
1300	223	242	260½	279	298	316½	335	353½	372	558
1400	206	223	240	257	274	291½	308½	325½	343	514
1500	293½	209½	226	242	258	274	290	306½	322	484

Length.	Brdth. of 10 A.	Brdth. of 15 A.	Brdth. of 20 A.	Brdth. of 25 A.	Brdth. of 30 A.	Brdth. of 35 A.	Brdth. of 40 A.	Brdth. of 45 A:	Brdth. of 50 A.	Brdth. of 55 A.
Yards	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*
1600	30	45	60½	75½	91	106	121	136	151	166
1700	28½	42	57	71	85	99½	114	128	142	156½
1800	27	40	54	67	80½	94	107½	121	134½	148
1900	25½	38	51	63½	76½	89	102	114½	127	140
2000	24	36	48½	60½	72½	85	97	109	121	133

Length.	*Brdth.* *of* 60 *A.*	*Brdth.* *of* 65 *A.*	*Brdth.* *of* 70 *A.*	*Brdth.* *of* 75 *A.*	*Brdth.* *of* 80 *A.*	*Brdth.* *of* 85 *A.*	*Brdth:* *of* 90 *A.*	*Brdth.* *of* 95 *A.*	*Brdth.* *of* 100 *A.*	*Brdth.* *of* 150 *A.*
Yards	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*	*Yards*
1600	181½	196½	212	227	242	257	272	287	302½	454
1700	171	185	199	213½	227½	242	256	270½	285	427
1800	161	175	188	201½	215	228½	242	255½	269	403
1900	153	165½	178	191	204	216½	229	242	255	382
2000	145	175	169½	181½	193½	200	218	230	242	353

THE

GENTLEMAN AND FARMER's

Pocket Aſſiſtant.

TABLE THIRD.

Shewing how many Roods (of 64 Square Yards each) are contained in a Piece of Land, having the Length and Breadth given.

Length.	Bth. of ½ R.	Bth. of 1 R.	Bth. of 2 R.	Bth. of 3 R.	Bth. of 4 R.	Bth. of 5 R.	Bth. of 6 R.	Bth. of 7 R.	Bth. of 8 R.	Bth. of 9 R.	Bth. of 10 R.	Bth. of 20 R.	Bth. of 30 R.	Bth. of 40 R.	Bth. of 50 R.
Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds	Yds	Yds.	Yds.	Yds	Yds.	Yds.	Yds.	Yds.
8	4	8													
10	3⅕	6⅖													
12	2⅔	5⅓	11												
14	2¼	4½	9	13¾											
16	2	4	8	12	16										
18	1¾	3½	7	10½	14¼	17¾									
20	1½	3¼	6½	9½	13	16	19¼								
22	1½	3	6	8¾	11½	14½	17½	20½							
24		2½	5½	8	10½	13½	16	18¾	21½	24					
26		2½	5	7½	10	12¼	14¾	17¼	19¾	22	24½				
28		2¼	4½	7	9¼	11½	13¾	16	18¼	20½	23				
30		2¼	4¼	6½	8½	10½	12¾	15	17	19	21¼				
32		2	4	6	8	10	12	14	16	18	20				
34		2	3¾	5¾	7½	9½	11¼	13	15	17	19				
36		1¾	3½	5¼	7	9	10¾	12½	14½	16	17¾	35½			
38		1¾	3½	5	6¾	8½	10	11¾	13½	15¼	17	33¾			
40		1¾	3¼	4¾	6½	8	9½	11¼	12¾	14½	16	32			
42		1½	3	4½	6	7½	9¼	10½	12¼	13¾	15¼	30½			
44		1½	3	4½	5¾	7¼	8¾	10¼	11½	13	14½	29	43½		
46		1½	2¾	4¼	5½	7	8¼	9¾	11	12½	14	27¾	41¾		
48		1¼	2¾	4	5¼	6¾	8	9¼	10¾	12	13¼	26¾	40		
50		1¼	2½	3¾	5	6½	7¾	9	10¼	11½	12¾	25½	38½		
52		1¼	2½	3¾	5	6¼	7½	8½	10	11	12¼	24½	37	49¼	
54		1¼	2¼	3½	4¾	6	7	8¼	9½	10¾	11¾	23¾	35½	47½	
56		1¼	2¼	3½	4½	5¾	6¾	8	9¼	10¼	11½	23	34¼	45¾	
58		1	2¼	3¼	4½	5½	6½	7¾	8¾	10	11	22	33	44	55¼

Length.	Bth. of 1 R.	Bth. of 2 R.	Bth. of 3 R.	Bth. of 4 R.	Bth. of 5 R.	Bth. of 6 R.	Bth. of 7 R.	Bth. of 8 R.	Bth. of 9 R.	Bth. of 10 R.	Bth. of 20 R.	Bth. of 30 R.	Bth. of 40 R.	Bth. of 50 R.	Bth. of 60 R.	Bth. of 70 R.	Bth. of 80 R.	Bth. of 90 R.	Bth. of 100 R.
Yd	Yd	Yd	Yd	Yd	Yd	Yd	Yd	Yd	Yd	Yd	Yd	Yd	Yd	Yd	Yd	Yd	Yd	Yd	Yd
60	1	2¼	3¼	4¼	5¼	6½	7½	8½	9½	10½	21¼	32	42½	53½					
62	1	2	3	4	5¼	6¼	7¼	8¼	9¼	10¼	20½	31	40¼	51½	62				
64	1	2	3	4	5	6	7	8	9	10	20	30	40	50	60				
66		2	3	4	4¾	5¾	6¾	7¾	8¾	9¾	19¼	29	38¾	48½	58¼				
68		2	2¾	3¾	4¾	5¾	6½	7½	8½	9½	19	28¼	37¾	47½	56½	66			
70		1¾	2¾	3¾	4½	5½	6¼	7¼	8¼	9¼	18¼	27½	36½	45¾	55	64			
72		1¾	2¾	3½	4½	5¼	6¼	7	8	9	17¾	26¾	35½	44½	53¼	62¼	71		
74		1¾	2½	3½	4¼	5¼	6	7	7¾	8¾	17¼	26	34½	43¼	51¾	60½	69¼		
76		1¾	2½	3¼	4¼	5	6	6¾	7½	8½	17	25¼	33¾	42	50½	60	67¼	75¾	
78		1¾	2½	3¼	4	5	5¾	6½	7¼	8¼	16½	24½	33	41	49¼	57½	65½	73¾	
80		1½	2½	3¼	4	4¾	5½	6½	7¼	8	16	24	32	40	48	56	64	72	80
82		1½	2¼	3¼	4	4¾	5½	6¼	7	7¾	15½	23½	31½	39	46¾	54½	62½	70¼	78
84		1½	2¼	3	3¾	4½	5¼	6	7	7½	15¼	22¾	30½	38	45¾	53	61	68½	76
86		1½	2¼	3	3¾	4½	5¼	6	6¾	7½	15	22¼	29¾	37¼	40¾	52	59½	67	74½
88		1½	2¼	3	3¾	4¼	5	5¾	6½	7¼	14½	21¾	29	36¼	43¾	50¾	58¼	65½	72¾
90		1½	2¼	2¾	3½	4¼	5	5¾	6½	7	14¼	21¼	28½	35½	42¾	49¾	56¾	64¼	71
92		1¼	2	2¾	3½	4¼	4¾	5½	6¼	7	14	20¾	27¾	34¾	41¾	48¾	55½	62½	69½
94		1¼	2	2¾	3½	4	4¾	5¾	6¼	6¾	13½	20½	27¼	34	40¾	47½	54½	61¼	68
96		1¼	2	2¾	3¼	4	4¾	5¼	6	6¾	13¼	20	26¾	33¼	40	46¾	53¼	60	66¾
98		1¼	2	2½	3¼	4	4½	5¼	6	6½	13	19½	26¼	32¾	39	45¾	52¼	58¾	65¼
100		1¼	2	2½	3¼	3¾	4½	5	5¾	6½	12¾	19¼	25½	32	38½	44¾	51¼	57½	64
200										3¼	6½	10	12¾	16	19¼	22½	25½	28¾	32
300										2¼	4¼	6½	8½	10¾	12¾	15	17	19¼	21¼
400										1½	3¼	4¾	6½	8	9½	11¼	12¾	14½	16
500										1¼	2½	3¾	5⅛	6⅖	7¾	9	10¼	11½	12¾
600										1	2¼	3¼	4¼	5¼	6½	7½	8½	9½	10¾

BRITISH MUSEUM
15 MAY 71

APPENDIX.

AN
EPITOME
OF THE ART OF
LAND SURVEYING,
DRAWN UP FOR THE USE OF HIS OWN PUPILS,

By J. VAUGHAN,
TEACHER OF
WRITING, ARITHMETIC, THE MATHEMATICS, &c.
At MALPAS, in CHESHIRE.

——— Si quid noviſti rectius iſtis,
Candidus imperti; ſi non, his utere mecum:
HORACE.

BRITISH MUSEUM
15 MAY 77

INTRODUCTORY ADDRESS

TO THE

DILIGENT PUPIL.

YOUR diligent Application to *Learning*, my dear Boy, affords me great Pleaſure, as it muſt certainly do to your Parents and Friends ; for Learning will not only make you the better reſpected, but will alſo afford you the greateſt Advantages: and while every day exhibits freſh inſtances of the great inconveniences to which thoſe are ſubject who at School *neglected* their Learning, you will be able to perform the various Tranſactions of Life with Eaſe and Pleaſure to yourſelf, and Satisfaction to thoſe with whom you have any Connexions. And now, as you are a perfect Maſter of the Rules of vulgar and decimal Arithmetic, &c. ſo judiciouſly laid down by Mr. *Dilworth* and Mr. *Walkinghame*, and are deſirous of attaining as ſpeedily as poſſible, the uſeful Art of Land-meaſuring before you proceed to higher Studies; I have taken ſome Pains to contract the whole into as narrow a Compaſs as poſſible for your preſent Information; adviſing you, if Time permits hereafter, and you aim at a perfect Knowledge of all the various Inſtruments and Methods of uſing them, to conſult thoſe valuable Authors, whoſe Prolixity would at preſent ſerve only to create a Confuſion in *your* Ideas; make yourſelf, therefore, at this Time, well acquainted with the following Treatiſe, which contains ſome Articles not to be found in other Authors; and which, if properly ſtudied, will, I think, be found a competent Guide to the young Land-Surveyor.

GEOMETRICAL PROBLEMS.

PROBLEM I.

To raiſe a Perpendicular on the End of a Line. See Figure 1.

SET one foot of your Compaſſes at the end *B*, and with the other, at what extent you think moſt convenient, deſcribe the Arch *c e f d*; with the ſame extent, and one foot in *C*, make a Mark at *e*, and keeping one foot at *e*, make another Mark at *f*; then, with one foot in *e*, deſcribe the Arch *h h*; and with one foot in *f*, deſcribe the Arch *g g*; a Line drawn from the Point firſt propoſed, through the Interſection, will be a true Perpendicular.

PROBLEM II.

From a Point aſſigned, to fall a Perpendicular upon a Line given. See Figure 2.

Set one foot of the Compaſſes in the given Point *C*, and ſtrike the Arch *D E* upon the given Line *A B*; then with above half the Diſtance *D E*, and one foot in *D* and *E* alternately, deſcribe with the other the Arches *f f* and *g g*: a Line drawn from the given Point *C*, ſtraight towards or through this Interſection, will be the Perpendicular required.

PROBLEM III.

To divide a Line into two equal Parts. See Figure 3.

With any extent, greater than half the given Line *A B*, and one foot in *A* and *B* alternately, ſweep with the other the Arches *c c* and *d d*, and draw a Line through their Interſections, which will biſect or divide the given Line into two equal parts.

PRO-

PROBLEM IV.

To lay down a Triangle the Length of whoſe Sides are given. See Figure 4.

Let *A B* = 44 Yards, *A C* = 25 Yards, and *B C* = 37 Yards. Draw a white Line for *A B* at pleaſure; from any Scale of equal Parts, take 44 within your Compaſſes, and lay down this Extent on the white Line; marking one end *A*, and the other *B*; with one foot in A, and with the Extent *A C* taken from the ſame Scale, deſcribe the Arch *d d*; and with one foot in *B*, and with the Extent *B C*, deſcribe the Arch *e e*, marking their Interſection: join *A C* and *B C* together, which will complete the Triangle required.

N. B. You may eaſily make the Triangle without any Letters or Marks.

PROBLEM V.

To take any Angle in a Field, by the Chain only. See Figure 5.

Suppoſe you are about to take the Angle *A*; let one end of the Chain be held or faſtened at the angular Point *A*, while you extend the other end of the Chain to *g* and *h* exactly a Chain's Length from the Angle; the Diſtance from *g* to *h* being meaſured, you will have three Sides of a Triangle, which you may plot by Problem 4, extending either Side of the ſaid Angle as far as you ſhall find neceſſary: in like manner take the Angles *C D E* and *F*, laying down the Diſtances *l m*, *n o*, *p q*, *r ſ*. As to the Angle *B*, it being an inward Angle, you may take it without going out of the Field, by laying down a Chain's Length from the Angle in a direct Line with each of the Hedges, which will be at *i* and *k*; the Diſtance between which will be equal to the Diſtance *t v*.

PROBLEM VI.

To deſcribe a ſquare Figure upon a given right Line. See Figure 6.

Draw the given Line *A B*, at one end of which, ſuppoſe *B*, raiſe a Perpendicular of the ſame Length; then taking that Length in your Compaſſes, and ſetting one foot in *C*, deſcribe the Arch *d d*; do the like at *A*, and deſcribe the Arch *f f*. Draw Lines from *A* and *C* to the Point of Interſection, and the Square is finiſhed.

PROBLEM VII.

To make a right-angled Parallelogram. See Figure 7.

First draw the Long Side *A B*, then the Perpendicular *B C*, and ſo proceed as in the foregoing Problem.

A knowledge of the ſeven foregoing Problems, will enable you to plot the following Figures.

GEODÆ-

GEODÆSIA,

OR

THE ART OF LAND-MEASURING.

Of the Chain.

THE Chain now uſed by Surveyors (commonly called Gunter's) is in Length 4 Poles or 22 Yards, and is divided into 100 Links with pieces of Braſs at every 10 Links for the readier counting of them.

Obſerve that an Acre, or 4840 ſquare Yards, contains 100,000 ſquare Links, being 10 Chains in Length, and 1 Chain in Breadth (or any Superficies equal to that). Now as the ten Chains in Length contain 1000 Links, and one Chain in Breadth contains 100 Links, theſe two multiplied into or by each other, produce 100,000 ſquare Links, by which you muſt divide whenever you are about to reduce ſquare Links into Acres.

To expreſs Chains and Links.

Suppoſe you would ſet down 14 Chains and 25 Links, you may do it with a Dot between, as thus, 14 . 25, becauſe the Links are ſo many decimal parts of a Chain; or you may omit the Dot, thus, 1425, that is 1425 Links; but if the Links are under 10, prefix a Cypher, thus 6 Chains 8 Links, 608 &c.

Of the Croſs-Sight.

The uſe of this is to know whether any Angle be a Right-angle or not, by the help of which you may find in a Trapezium or Triangle upon what part of the Diagonal or Baſe the Perpendiculars fall: you may get any Carpenter to make it by the following Directions.

Take a Board about 4 Inches broad, and 1½ inches thick, either round or ſquare: this with two Kerfs ſawn upon it, to croſs each other in the Centre at Right-angles, being placed upon a Stick about 5 Feet high, and ſhod with an iron Ferril, will repreſent the Inſtrument called a Croſs-Sight; a ſight of which is ſufficient to ſhew its application to Angles.

I ſhall however, for the ſake of any one who has no other opportunity of becoming acquainted with its uſe, add this one direction how to find in the Field upon what part of a Baſe or Diagonal Line a Perpendicular falls. Suppoſe you were meaſuring the Diagonal of the Trapezium *A B C D*, (*ſee Figure* 14) and wanted to know from what part of that Diagonal to meaſure the Perpendiculars *e D* and *f B*: remove your Croſs-Sight backwards and forwards along the ſaid Diagonal Line, till through the Kerfs you can ſee the Angles *A C*, with one of the Angles from which the Perpendicular you are about to meaſure falls, as *D* and *B*.

Of

Of the Off-ſet Staff.

This Staff is in Length 10 Links or 6.72, and is uſeful in taking Angles or Off-ſets, and in meaſuring all ſhort Diſtances.

Of the Station-Staffs and Arrows.

The Station-Staffs ſhould be three in number, about five Feet in length, each with white Rags or ſomething conſpicuous diſplayed at its top: they are to be fixed in the Angles to or from which you are meaſuring.

The Arrows ſhould be ten in number, each about twelve Inches long, with bits of red Cloth tied to the top of each; one of theſe is to be ſet down at the end of every Chain by the Foremoſt (or Leader) who is to carry the reſt in his left hand except one, which, with the end of the Chain, muſt be held in the right hand, ready to be ſtruck down when the hindermoſt comes to the other. A ſight of the foregoing Inſtruments will render a farther deſcription of them unneceſſary.

Of the Scale and Compaſſes.

Beſides the foregoing, it will be neceſſary to be provided with a plain Scale and pair of Compaſſes for plotting, &c. Now as this Compendium is not intended to preclude the neceſſity of a Tutor, but to facilitate his labour, &c. a deſcription of ſuch Inſtruments is left to the Teacher himſelf.

PROPOSITION I.

To meaſure a Square.

RULE.

Multiply a Side into (or by) itſelf, the Product will be the Area or Square Content. *See Figure* 8.

PROPOSITION II.

To meaſure a Parallelogram.

RULE.

Multiply the Length by the Breadth, the Product is the Area, or Square Content. *See Figure* 9.

Obſervation

Oſervation 1. How the Length multiplied by the Breadth produces the Area, will appear from an Inſpection of *Figures* 8 and 9; the former, whoſe ſide is four Yards, being divided as above, is found to contain four Rows, each Row four ſquare Yards, *i. e.* 4 times 4, which is 16: and the Parallelogram contains 4 Rows, each Row 8 ſquare Yards *i. e.* 4 times 8=32 ſquare Yards, the Area or Superficial Content.

Obſervation 2. If the Angles or Corners of any four-ſided Field, &c. be not exactly like the Angles of the Square (*ſee Figure* 8) which are what we term Right-Angles, ſuch a Field ſhould be meaſured not as a Square, or Parallelogram, but as a Trapezium; by which Method, you may find the Area of any quadrilateral (or four-ſided) Figure, whether it be a Square, Parallelogram, Rhombus or Rhomboides. *See Prop.* 4, *Fig.* 14.

PROPOSITION III.

To meaſure a Triangle.

RULE.

Multiply the Baſe by half the Perpendicular, or half the Baſe by the whole Perpendicular, or the Baſe by the Perpendicular and take half the Product; either of theſe operations will give you the Area, or Content of a Triangle. *See Fig.* 10, 11, 12, 13.

Obſervation. The reaſon for taking half the Product, &c. is becauſe the Baſe and Perpendicular of every Triangle are the Length and Breadth of its circumſcribing Square or Parallelogram, which contains exactly twice the quantity of the Triangle. To prove this, turn to the Parallelogram, *Figure* 9, divide it into two Triangles by a Line from *B* to *C*, or from *A* to *D*, and you will preſently underſtand what I now obſerve.

In like manner Segments of Circles, or curved Hedges, may be called $\frac{3}{4}$ $\frac{4}{5}$ or $\frac{5}{6}$ of their circumſcribing Parallelogram, according as they are more or leſs curved.

PROPOSITION IV.

To meaſure a Trapezium.

RULE.

Draw a diagonal Line from the moſt acute Angle to its oppoſite Angle, upon which let fall two Perpendiculars from the two remaining Angles. *See Figure* 14.

Multiply the half of that diagonal by the ſum of the two Perpendiculars, or the whole of that Diagonal by half the ſum of the two Perpendiculars, the Product will be the Area required.

As the Diagonal Line divides the Trapezium into two Triangles, it may eaſily be plotted by *Prob.* 4, *Fig.* 4.

PROPOSITION V.

To meaſure a Field, &c. of irregular Breadth.

See Figure 15.

RULE.

If you find conſiderable variations in the Breadth of a Field &c. one part being wide, another part narrow, &c. take the Breadth in ſeveral places, as *a a*, *b b*, *c c*, *d d*, *e e*, and *f f*: add theſe Breadths together, divide their ſum by the number of Breadths, the Quotient will be the mean Breadth, by which you muſt multiply the Length, and you will have the Contents.

PROPOSITION VI.

How to meaſure any Field, &c. by the Chain and Croſs-Sight.

If you are only to find the Contents of a Field, and a Map of the ſame is not required, the readieſt way will be to make uſe of your Croſs-Sight, unleſs you make uſe of the Tables, with which I have furniſhed you, in "*The Gentleman and Farmer's Pocket Aſſiſtant.*"

The uſual method of meaſuring with the Chain and Croſs-Sight, is to divide your Field into Triangles and Trapezia, meaſuring only the Baſe and Perpendicular of a Triangle, (*ſee Prop.* 3.) and the Diagonal Line and Perpendiculars of a Trapezium, *See Prop.* 4.

In *Figure* 16 the imaginary Lines dotted thus (- - - -) divide the Field into Triangles and Trapezia; the Lines dotted thus, (.........) repreſent the Diagonal Line, Baſe, Perpendicular, &c. neceſſary to be meaſured; then find the contents of each Trapezium by *Prop.* 4. and of the Triangles by *Prop.* 3. and it is done.

PRO-

PROPOSITION VII.

To meaſure and plot any Quantity of Land by the Chain only.

Divide the Field into Triangles and Trapezia; meaſure the three Sides of a Triangle, and the four Sides and Diagonal Line of a Trapezium: plot both the Triangles and Trapezia by *Prob.* 4. each Trapezium being two Triangles: and caſt them up by *Prop.* 3 and 4; add their Contents together, their Sum will be the whole Content.

If you chuſe to plot anumber of contiguous Fields by this method of taking them ſingly, (which is the ſureſt for a young beginner) and, after having meaſured one Field, you are about to meaſure another contiguous to it; it is not requiſite to meaſure again the Hedge between the field you are meaſuring and the Field you have meaſured.

There is a more expeditious method of meaſuring and plotting a number of contiguous Fields, &c. by ſtraight imaginary Lines, taken either parallel or at diſcretion through the whole, having the Angles and Diſtances of their Extremities duly taken for plotting them properly, and taking (as you proceed) right and left Off-ſets from the ſaid Lines to Hedges, Ponds, or any thing remarkable, and the diſtance laid down on the ſaid Lines to Hedges, &c. that croſs them.

The following is an Exemplification of this Method.

Suppoſe I had an Eſtate to meaſure and map, conſiſting of 15 contiguous Fields, lying in the Form of *Figure* 17.

Meaſure and lay down all the Lines and Off-ſets dotted thus, (.........) beginning to meaſure the dotted Line *A B*, and, as in Land Meaſuring it is moſt regular to proceed with the Sun, except when the Situation, Figure, &c. of a Field points out the neceſſity of deviating from that Plan; proceed from *A* to *B*, laying down the diſtance of each Off-ſet from *A*; with the diſtance of each Off-ſet, &c. from *C*, in the dotted Line *C P*; and from 9, in the dotted Line *q v*; meaſure alſo, and lay down, per *Prob.* 5. (either in your

Field Book, or, if you plot it in the Field, upon the rough Draught,) the Angles *B*, *C*, *p*, *q*, with the Hedges, &c. *B C*, *i b*, *k l*, *k j*, *n o*, *n m*, *p D*, *p q*, *q E*, *x y*, *r f*, *ſ K*, *t L*, *t w*, and *v H*. Laſtly, the diſtances *H C*, and *A p*, compared with diſtances in the plot, will prove the whole.

The Uſe of the Plain Table.

The Plain Table being the moſt uſeful Inſtrument for Surveying, and ſo contrived as to ſupply the Place of both Theodolite, Circumferentor, and Semicircle; I ſhall, as a Sight of the Inſtrument will render a deſcription unneceſſary, omit that, to make room for a Page or two reſpecting its uſe.

To take the Plot of a Field at one Station by the Plain Table.

See Figure 18.

Suppoſe you were about to plot the Field *A B C D E*. Place your Table with a ſheet of Paper on it, at a place from whence you can ſee all the Angles, ſuppoſe at ⊙: turn the Table about till the Needle hangs directly over the Meridian Line, which you may know by its points North and South; the former being generally marked with a Flower-de-luce; then ſcrew the Table faſt, and draw a line acroſs your Paper parallel to the Meridian line of the Card, which line will be the Meridian Line of your Plot (except in places where the Compaſs varies;) then apply the thin ſide of your Index to a Pin erected at ⊙, and turning it about till thro' the Sights you can ſee the angle *A*, draw with your Black-lead Pencil the Line ⊙ *A*. Do the ſame by the Angles *B C D* and *E*, and having meaſured the diſtance from ⊙ to each of the Angles, ſet it off with the Scale and Compaſſes upon their reſpective Lines ⊙ *A*, ⊙ *B*, ⊙ *C*, &c. then, having marked thoſe Angles, draw Lines from mark to mark, and you will have the true Plot protracted in the Field.

To plot a Field by the Plain Table at two Stations, when all the Angles cannot be ſeen from one. See Figure 19.

Suppoſe the Field *A B C D E F G H I K*, to be ſo large or irregular that you cannot ſee all the Angles from one Station;

make choice of two convenient Stations, as far from each other as the Field will conveniently admit of, as *L* and *M*. Fix the Table, take ſights, meaſure, protract, &c. as before directed, the Angles which are near to the firſt Station *L*, *viz. H I K A B C:* then ſet up a conſpicuous Mark at *M*, the place where you intend to have your ſecond Station, turn your Index till through the Sights you can ſee that Mark: draw the Stationary Line *L M*, on which ſet off the diſtance, meaſured between the two Stations; remove the Pin from *L* to *M*, turn the Table till the Needle hangs over the Meridian Line, as before; for want of a Compaſs, lay the thin ſide of the Index along the Stationary line *L M*, and turn the Table, till through the Sights you can ſee a Mark left at *L*, your firſt Station; then ſcrew it faſt, take Sights to the remaining Angles *D E F* and *G*, meaſure and lay down their diſtances from *M:* then Lines drawn from mark to mark, as before, will complete the plot.

Note. The above Directions for removing the Table from one Station to another, are ſufficient to give you an idea of the manner of plotting Woods, Ponds, &c. by going round them.

There are ſo many uſeful and curious matters in Land Surveying, that to notice them all would make this Volume quite too large for a *Pocket Aſſiſtant.* I beg leave, therefore, to direct thoſe whoſe age qualifies them for, and whoſe peculiar profeſſions require, a more copious knowledge of this uſeful Art, to conſult ſome of the beſt modern Authors; for, as the greateſt part of this Publication is not to be found in any Book that I have met with, I hope the *candid* Reader will not take it amiſs that there are uſeful Articles in *other* Books not to be found in *mine.*

THE END.

The various Methods of Land Surveying, with the uſe of the Theodolite, Sector, Circumferentor, Protractor, Semicircle, and Plain Table, are taught Theoretically, and Practically, at the Grammar School, Malpas, near Whitchurch, by J. VAUGHAN; who takes this opportunity of thanking his Friends for paſt Favours, and of aſſuring thoſe Parents, Guardians, &c. who intend to honour him with the care of their Children, that all his hopes of *future* Patronage, are founded upon that unremitted Attention and Tenderneſs which have *hitherto* gained him the general approbation of his Patrons; this public Avowal of which, he is confident, will meet with the Sanction of all thoſe numerous and reſpectable Friends, who have for ſeveral years favoured him with their Patronage: and as the attention requiſite to be beſtowed on each, induces him to limit the number of his Boarders to twenty, and there are at preſent ſeveral Vacancies, any Letter addreſſed to him as above, ſhall be immediately attended to.

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Fig. 1

Fig. 3

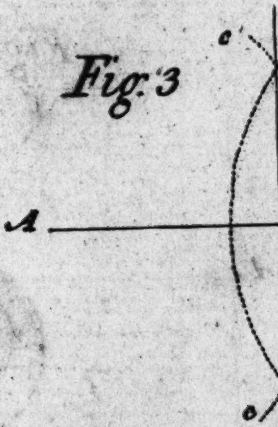


Fig. 5

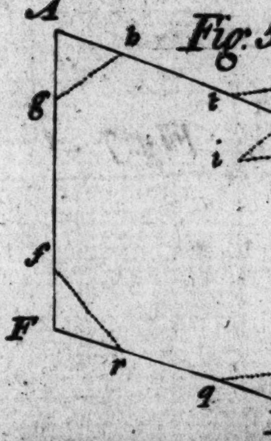


Plate 1

Fig. 1

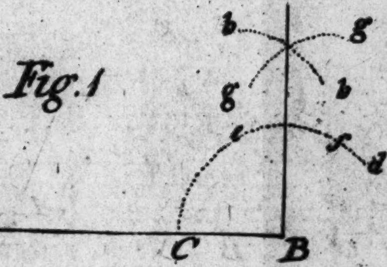
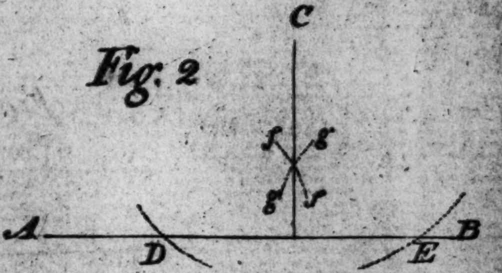


Fig. 2



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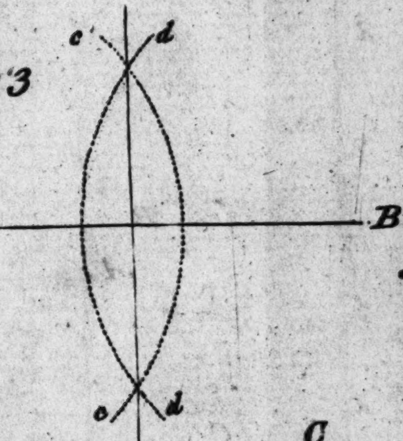
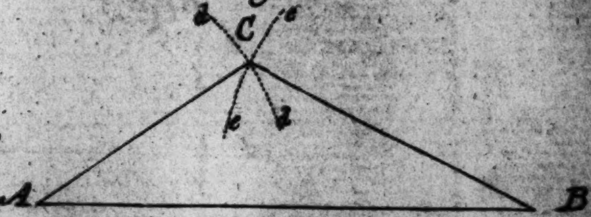


Fig. 4



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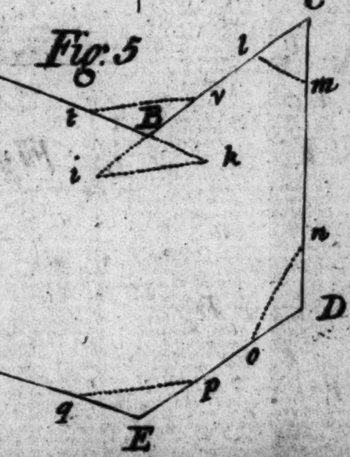

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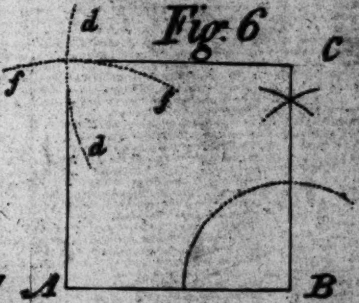

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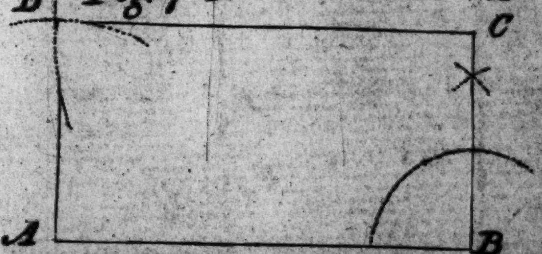

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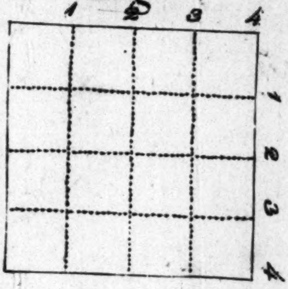


Fig: 12

An Isosceles Triangle

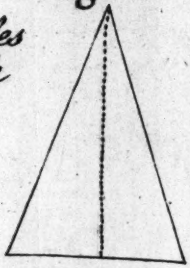


Fig: 15

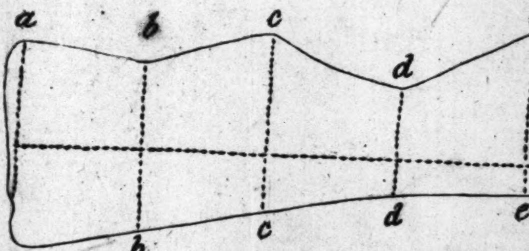


Plate 2

Fig: 9

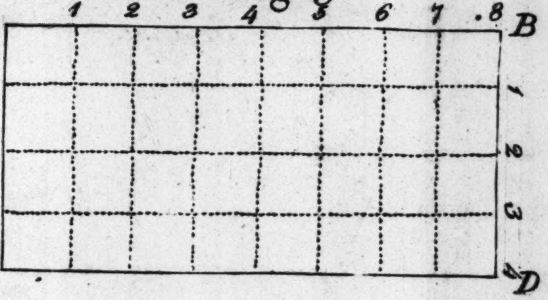


Fig: 10
An Equilateral Triangle

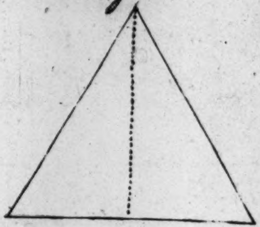


Fig: 11
A right angled Triangle

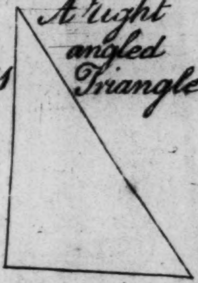
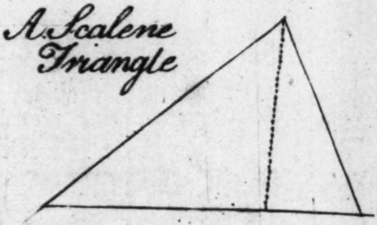


Fig: 13

A Scalene Triangle



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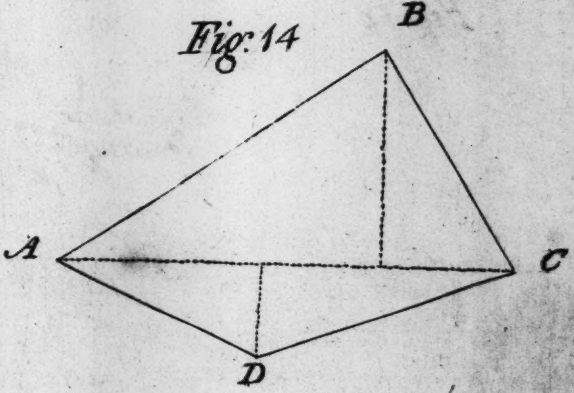


g: 15

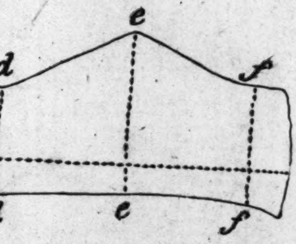
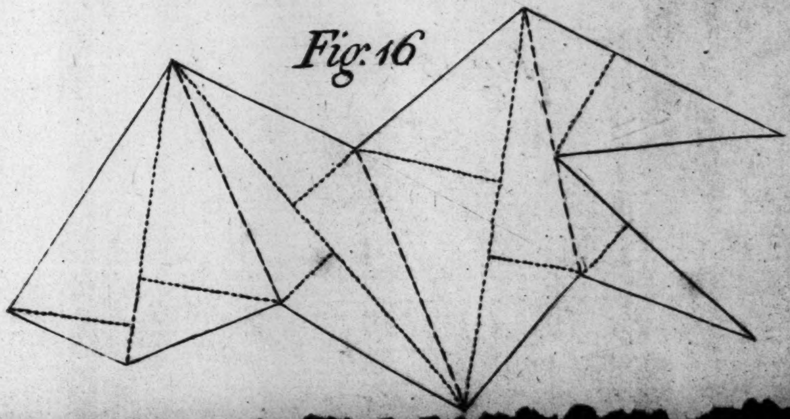


Fig: 16



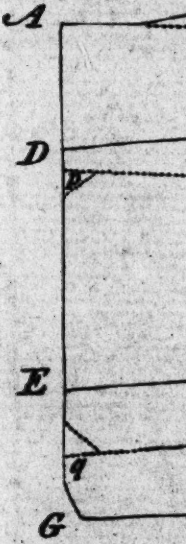


Fig 18

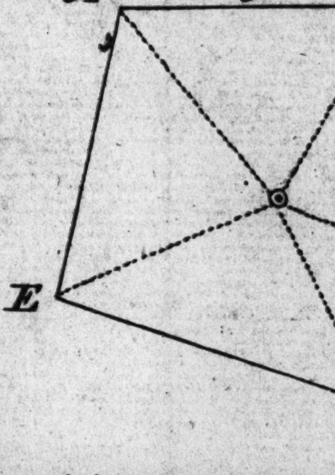


Plate 3

Fig. 17

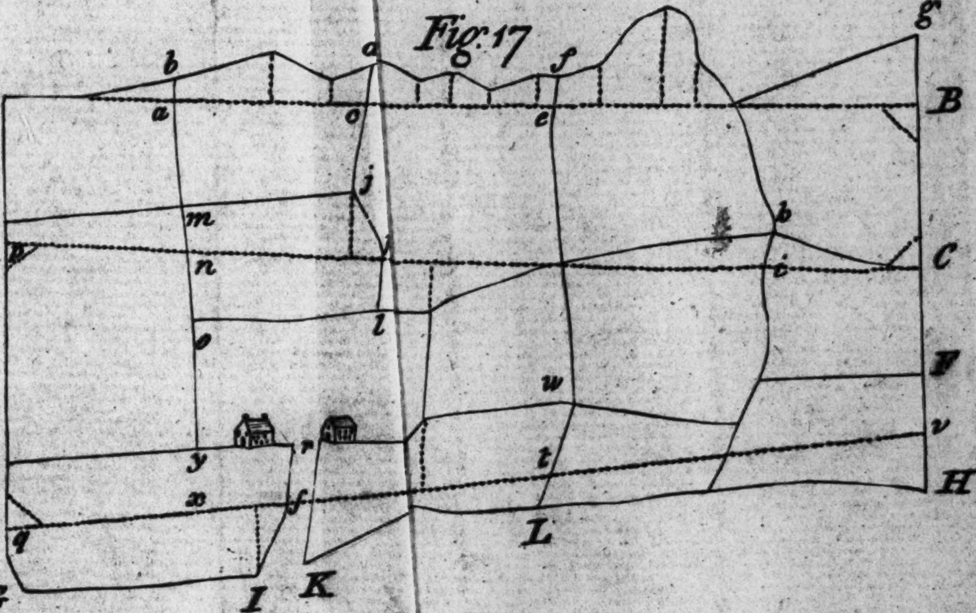


Fig 18

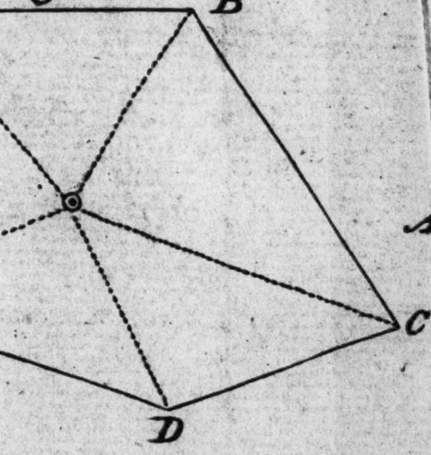


Fig. 19